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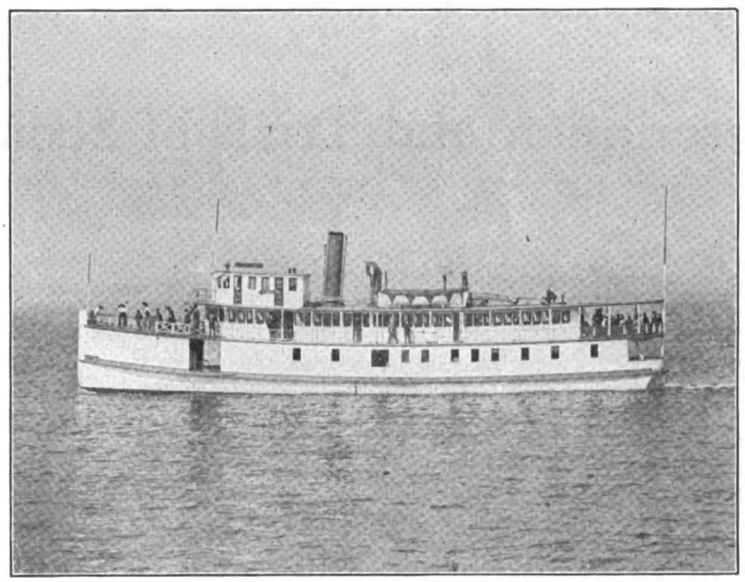
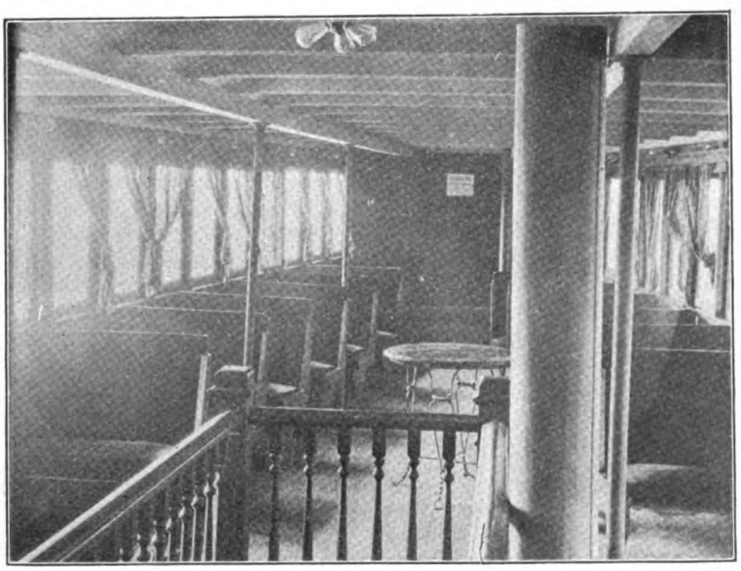
PUGET SOUND STEAMER WHIDBY.

One of the neatest of the new small steamers plying the waters of Puget Sound is the Whidby, owned by the Island Transportation Co., Seattle, of which James D. Esary is president and Capt. H. B. Lovejoy, manager. The Whidby is one of a fleet of four steamers owned by this company and is operated between Seattle and Whidby Island points. She was designed by Capt. Lovejoy and built under his personal supervision at the company's private yard at Coupville, Wash.

The lines of the hull are very clean and follow the torpedo boat style. The bottom, which is rather flat, sweeps upward toward the stern. In this respect the Whidby is a radical deviation from the standard type of small steamers found on Puget Sound. The older boats are nearly all built on the conventional deep keel lines with overhanging stern counters. The clean fashion in which the new steamer slips through the water fully justifies the departure from the accepted models.



STEAMER WHIDBY.



VIEW OF LADIES' CABIN STEAMER WHIDBY.

The Whidby is 115 ft. in length between perpendiculars, 125 ft. over all, 21 ft. molded beam, and draws 7 ft. of water when normally loaded. Her gross tonnage is 192. The hull planking, which is fir laid in 40 to 60 ft. lengths, has a net thickness of 2½ in. The frames are 8 by 10 in. at the keel, 8 by 6 in. at the head and are spaced 18 in. between centers. The deck beams are 5 by 9 in. Exceptional stiffness is given the hull by the construction of a double Howe truss on both sides.

The machinery is compactly installed and the main steam header from the boiler to the engine has no unnecessary bends. The boiler, which was built by the Taylor Water Tube Boil-

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er Co. of Detroit, Mich., is 9 ft. 7 in. in length and 9 ft. 9 in. high. The heating surface is 1,800 sq. ft. The plates of which the drums are constructed are 13/32-in. thick; the total safety valve area is 7.06 sq. in. and the licensed pressure is 250 lbs. per sq. in. The furnace is fitted with crude oil burners using steam blown atomizers. At 185 lbs. pressure, 200 R. P. M. of engine, and a speed of 14.4 miles per hour the oil consumption is 1.4 bbl. per hour. The market price of crude oil is now $1.10 per bbl.

The engine is triple expansion, condensing, and was built by the Detroit Ship Building Co., Detroit. The cylinders are 10, 16½ and 26 in. in diameter by 15-in. stroke. The engine is coupled to a four-blade cast iron propeller, 69 in. in diameter with 8-ft. pitch. With 250 lbs. boiler pressure the engine turns on this wheel 225 R. P. M., exerting 400 I. H. P., and with 21 per cent propeller slip drives the Whidby 16.3 miles per hour. Her normal speed on her regular run is 14.4 miles per hour.

The boat is electric lighted throughout, there being 220 incandescent lights in all. Current is provided by a direct current generator driven by an upright high speed single cylinder engine.

The cabin fittings are exceptionally good for a small steamer. Forward under the pilot house is the roomy smoking room and men's cabin fitted with wood bottom opera chairs. The ladies' cabin aft is neatly carpeted and provided with plush upholstered car seats arranged along each side of the cabin with a wide aisle between. A 4-ft. stairway in this cabin leads from the passenger deck to the main deck below. Another narrower stairway is placed forward of the pilot house. On the main deck aft of the engine room is a dining room, galley, state rooms for certain of the steamer's officers and six two-berth passenger state rooms. The Whidby is licensed to carry 150 passengers regularly. The main deck forward of the boiler is kept clear for freight. Here is located a two-cylinder, single drum, steam driven freight hoist, used principally for helping trucks up steep docks at low tide.

Description and Trials of Scout Cruiser Chester.*

BY LIEUT. A. F. H. YATES, U. S. NAVY, MEMBER.

The Chester is one of three scout cruisers authorized by an act of congress, approved April 24, 1904. Owing to the rapid development of the steam-turbine for marine use, the navy department decided to contract for these three vessels to be exactly similar but for their propelling machinery. The contract for the Chester was made with the Bath Iron Works, Ltd., of Bath, Me., on May 4, 1905, and called for her completion and delivery to the government on or before the expiration of 36 months from the above date. The propelling machinery of the Chester consists of Parsons' marine steam-turbines, driving four independent shafts, each shaft being fitted with one propeller, and cruising turbines fitted to give economy at low power. Exclusive of the cruising turbines, there are two main high-pressure turbines exhausting into two low-pressure turbines, and in each of the latter there is incorporated a reversing turbine. To obtain economy at low and moderate speeds, the six turbines may be used in three combinations:

First, for Low Speeds—up to About 18 Knots.—The steam passes through all six ahead turbines, both the high pressure cruising and the intermediate pressure cruising being connected up with the four main turbines. Steam admitted to the high pressure cruising exhausts into the intermediate pressure cruising, and from the latter exhausts through separate pipes to each of the main high-pressure turbines. From these latter it exhausts into the low pressure turbines, and then into the main condensers.

Second, for Moderate Speeds—up to About 23 Knots.—The steam passes through five ahead turbines, steam being admitted to the intermediate pressure cruising turbine and passing thence to the two main high pressure turbines, and from each of them to the connected low pressure turbine. The high pressure cruising turbine revolves idly in a vacuum.

Third, for Highest Speeds.—Only the four main turbines are used, steam being admitted to each main high-pressure turbine. Both cruising turbines revolve idly in a vacuum.

Reduction of power in each of the arrangements is obtained by throttling. Increased power may be obtained by admitting live steam to the intermediate-pressure cruising turbine in the first arrangement, and to the main high-pressure turbine in the second arrangement. By-pass valves are fitted from the first to the second expansions in both main high-pressure, and auxiliary exhaust steam may be admitted to the second expansions in main high pressure turbines and to both low pressure receiver pipes.

The turbines were designed for a working pressure at the turbines of 250 lb. per sq. in., and to drive the shafts at 502 R. P. M. for the contract speed of 24 knots.

The contracts for the other two vessels, the Birmingham and the Salem, were awarded the Fore River Ship Building Co., of Quincy, Mass., the Birmingham to be equipped with two vertical, inverted-cylinder, direct-acting, triple-expansion engines of navy department's design, and the Salem with two seven-stage, Curtis, reversible, marine steam-turbines.

General hull data of the Chester are as follows:

HULL DATA.

Length between perpendiculars	420 ft.
Length over all	423 ft. 2 in.
Length on water line (16 ft. 9.5 in.)	420 ft.
Length of straight keel	340 ft. 6 in.
Beam, extreme, at 16 ft. 9.5 in. water level	47 ft. 1⅛ in.
Beam, extreme, on main deck	40 ft. 5 in.
Greatest beam, hull proper, situated at normal low-water level	47 ft. 1⅛ in.
Breadth over all	47 ft. 1⅛ in.
Draught to top of keel	16 ft. 8⅛ in.
Moulded depth (from top of main deck beam at side to bottom of frame at M.P.)	36 ft. 5⅝ in.
Keel projects below moulded base line	⅛ in.
Ratio of length to beam	8.97
Ratio of immersed area of longitudinal section to rudder area	34.1
Number of screws	4
Outboard shafts, incline up and forward, angle	2.45 deg.
Inboard shafts, incline up and forward, angle	1.44 deg.
Shafts diverge at an angle with center line of ship	0.72 deg.
Outboard shafts, center line at frame No. 78, from center line of ship	10 ft. 4 in.
Inboard shafts, center line at frame No. 78, from center line of ship	3 ft. 6 in.
Outboard shafts, center line at frame No. 78, from base line	15 ft. 10 in.
Inboard shafts, center line at frame No. 78, from base line	12 ft.
Outboard shafts, center line at frame No. 131, from center line of ship	12 ft. 4 in.
Inboard shafts, center line at frame No. 131, from center line of ship	5 ft. 6 in.
Outboard shafts, center line at frame No. 131, from base line	9 ft.
Inboard shafts, center line at frame No. 131, from base line	8 ft.
Outboard shafts, rake up and forward per foot	0.52 in.
Inboard shafts, rake up and forward per foot	0.31 in.
Both shafts, rake outward per foot	0.15 in.
Distance of center line of outboard screws forward of A.P.	43 ft. 2¼ in.
Distance of center line of inboard screws forward of A.P.	24 ft. 7¼ in.

*From the Journal of the American Society of Naval Engineers.

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Distance of center line of outboard screws from center line of ship	12 ft. 4 in.
Distance of center line of inboard screws from center line of ship	5 ft. 6⅜ in.
Strut centers for outboard shaft forward of A.P.	46 ft.
Strut centers for inboard shaft forward of A.P.	28 ft.

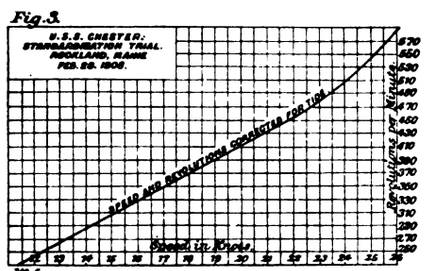
Steaming Trials.—The wonderful results attained by the Chester during her trials far exceeded all expectations and established her as the fastest man-of-war in the world of over 1,500 tons displacement, and, indeed, as the fastest of all the world's large vessels.

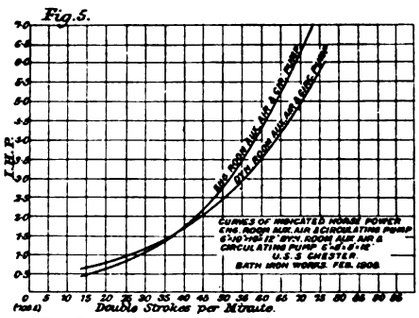
The contract required a progressive trial over a measured-mile course for the purpose of standardizing the screws, extending from maximum speed down to a speed of about 12 knots; a full-speed trial of 4 hours' duration in the open sea, guaranteed speed not to be less than an average of 24 knots, as determined by the standardization curve, air pressure not to exceed 5 in. of water, displacement with 475 tons of coal, etc., on board not to exceed 3,750 tons; two endurance and coal-consumption trials, each of 24 hours' duration, one to be run at an average uniform speed of about 12 knots under service conditions, and the other to be run at a uniform speed to average not less than 22.5 knots under service conditions; displacement on each trial to average as on full-speed trial.

The date set for the beginning of these trials was Feb. 27, 1908, and on Feb. 13 the builders took the Chester to the navy yard at Charlestown, Mass., for drydocking. There her bottom was cleaned and painted, after which she returned to the works of the company at Bath. After leaving Bath for Charlestown the vessel was taken to Southport, Maine, for a private standardization. but as the weather was unfavorable, no satisfactory results could be obtained. Both on the run to and from Charlestown the vessel was run at varying speeds to determine the general conditions of the machinery, and to become acquainted with existing pressures, etc. On the run to Charlestown it was found that at high pressures on cruising turbines the gland system was not handling all of the gland leak-off steam from the high-pressure and intermediate-pressure cruising turbine, admission of this steam being at that point, causing local and unequal expansion. This practice was discontinued, and no similar trouble experienced subsequently.

It should, perhaps, be remarked that, previous to the run to Charlestown, a dock trial of the machinery was held at the works. This trial was held on Feb. 6, 1908, and lasted 3 hours, beginning at 11 A. M. and ending at 2 P. M. From 11 A. M. to meridian steam was admitted to the high-pressure cruising-turbine, all six turbines being in operation. The average revolutions of all shafts was 197.5. From meridian to 1 P. M. steam was shut off the high-pressure cruising turbine and admitted to the intermediate-pressure cruising turbine, the former running in a vacuum. Five turbines were then in operation. The average revolutions of all shafts was 191.5. From 1 P. M. to 2 P. M. steam was shut off the intermediate-pressure cruising turbine and admitted to both main high-pressure turbines. Both cruising turbines then ran idle in a vacuum, the four main turbines being in operation. The average revolutions of all four shafts was 193.4. The machinery worked most satisfactorily throughout the trial. A short backing test concluded the trial. The data obtained, having little significance, are omitted from these papers.

On Feb. 25, the Chester left Bath for Rockland, Me., arriving in a few hours. A private standardization trial was held by the builders upon arrival for the purpose of preparing for efficient manage-





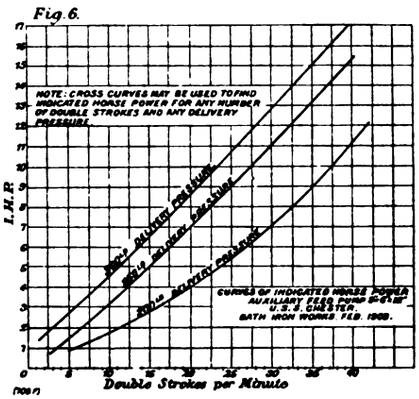


Fig.6.
NOTE: CROSS CURVES MAY BE USED TO FIND INDICATED HORSE POWER FOR ANY NUMBER OF DOUBLE STROKES AND ANY DELIVERY PRESSURE.
I.H.P.
CURVES OF INDICATED HORSE POWER
U.S.S. CHESTER
BATH IRON WORKS FEB. 1908.
Double Strokes per Minute

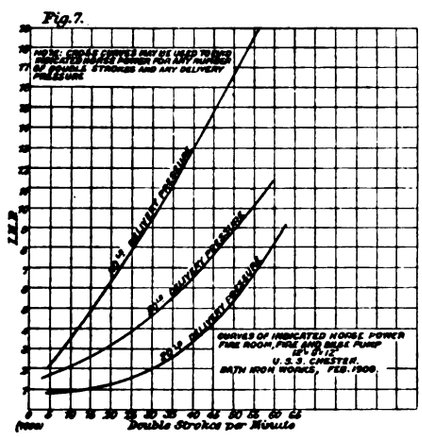


Fig.7.
NOTE: CROSS CURVES MAY BE USED TO FIND INDICATED HORSE POWER FOR ANY NUMBER OF DOUBLE STROKES AND ANY DELIVERY PRESSURE.
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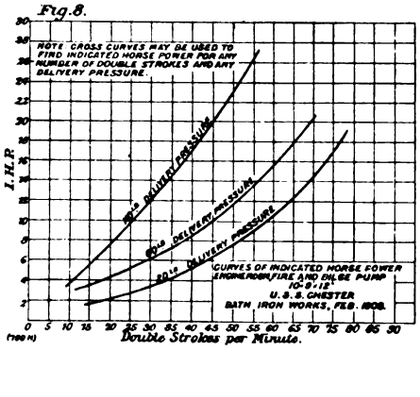
Fig.8.
NOTE: CROSS CURVES MAY BE USED TO FIND INDICATED HORSE POWER FOR ANY NUMBER OF DOUBLE STROKES AND ANY DELIVERY PRESSURE.
I.H.P.
CURVES OF INDICATED HORSE POWER
U.S.S. CHESTER
BATH IRON WORKS, FEB. 1908.
Double Strokes per Minute.

SCOUT CRUISER CHESTER.

sure cruising turbines, and consequently an excessive amount of steam vapor found its way into the forward engine-room. This was remedied upon arrival at Charlestown by installing a branch-pipe from the forward section of gland-equalizer piping to the starboard low-pressure exhaust to condenser. On starting the port main high-pressure turbine on one occasion a slight grinding noise was heard, and upon arrival at Charlestown the casing of this turbine was lifted and the blading examined. The casing-blades, particularly in the second expansion, were found to be slightly distorted, and the binding wire broken in a few places. The blades were straightened, filed down somewhat, and soldered. There is no doubt but what this was due to heating the turbine with auxiliary exhaust steam, when warming up before turning the turbine, admission of this steam being at that

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ment of the machinery on the occasion of the official standardization trials. On the 26th the naval board of inspection and survey, arrived at Rockland and went on board. The weather being unfavorable upon the date set for the trial (Feb. 27), the latter was postponed until the next day.

Official Standardization Trial.—The standardization trial was held on Feb. 28, 1908, beginning at 8:22 A. M. and ending at 12:32 P. M. There were about 325 people on board, comprising government representatives, ship yard officials, and crew. About 740 tons of coal remained on hand. The vessel carried no other water than reserve feed, and was ballasted by handling the coal. The draft and displacement, both at beginning and end of the trial were:

	Beginning.	End.
Draught, forward	16 ft. 2⅝ in.	15 ft. 11¼ in.
Draught, aft	17 ft. 0⅝ in.	17 ft. 0½ in.
Draught, mean	16 ft. 7⅝ in.	16 ft. 6 in.
Displacement	3720 tons	3673 tons
Estimated mean draught at middle of five high-speed runs	16 ft. 6¾ in.	
Corresponding displacement	3696 tons	

The water was fair, with a light mist at the beginning, gentle breezes from the westward, and a smooth sea with a very light swell from the S. E. Seventeen runs were made over the measured mile, alternately north and south. The first three runs were made at about 12 knots, the next three at about 15.5 knots, and the next five at full speed—about 25 knots. Following the high-speed runs, three runs were made at about 23 knots and three at about 19 knots.

The speed curve was plotted through points determined by taking the mean of the various groups of runs made at each of the five speeds above referred to, and is shown on Fig. 3.

24-Hour Trial at 12 Knots.—At 4:45 P. M. on the same day the Chester left the harbor of Rockland for the endurance and coal-consumption trial at 12 knots, the interval between the close of the standardization trial and this time having been utilized for carrying out the anchor test, cleaning the four after boilers, etc. The trial officially began at 5 P. M. The weather was fair and cold, with stiff to fresh breezes from the N. N. W.

On this trial only the after fire-room—boilers I, K, L, and M—was used, under natural draft. The following auxiliaries were run: one dynamo, one main feed-pump, two main air-pumps, two main circulating pumps, two vacuum augmenters, one oil-pump, one sanitary pump, steering-engine, and one ash-hoist as required. As this run was primarily for the purpose of determining the coal consumption at this speed, the coal used was carefully tallied by baskets, though the bunkers were striped, and this latter method relied upon for the exact amount of coal used. The weight of the coal per cu. ft. had previously been determined by the inspector of machinery at the works. For this purpose the weight of a bin of coal, containing about 55 cu. ft. was taken. The firing interval on this run was from 1 minute 30 seconds to 2 minutes, and was based on supplying three shovels, or about 40 lb., each time. The furnace doors were numbered as shown in Fig. 2. As will be seen, the numbers are so arranged that two adjacent doors have the same number.

The Corey time-firing device installed displays in succession the numbers 1, 2, 3, 4, 5, and 6 at such intervals as desired. It consists of a cylindrical case with a glazed opening near the bottom, at the back of which there is fixed a fixed white incandescent light. Between the light and the glazed opening there is a revolving aluminum dial, actuated by an electro-magnet, with stencilled figures from 1 to 6 inclusive. A motor-driven transmitter is located in the forward engine-room, and so wired to indicators that the numbers will be indicated in all fire-rooms at the same time. Upon the display of a number the furnace-doors bearing that number were opened, and the fires therein coaled or raked, the latter being left to the judgment of the fireman. This general practice was followed throughout the succeding trials.

During this run the eight boilers in No. 1 and No. 2 fire rooms were cleaned preparatory to the full-speed trial.

All six turbines were in use, steam being admitted to the high-pressure cruising turbine. All machinery worked most satisfactorily throughout the entire run. The average R. P. M. were 249.69, corresponding speed 12.2 knots. The total coal burned was 43.832 tons, 6.68 knots per ton of coal.

Draught and displacement:

	Beginning.	End.
Draught, forward	16 ft. 5⅞ in.	16 ft. 2⅝ in.
Draught, aft	16 ft. 11⅝ in.	16 ft. 9⅝ in.
Draught, mean	16 ft. 8¾ in.	16 ft. 6⅛ in.
Displacement	3750 tons	3671 tons
Estimated mean draught at middle of trial	16 ft. 7⅞ in.	
Corresponding displacement	3710 tons	

Four-Hour Full-Power Trial.—At the conclusion of the last trial, at 5 P. M., Feb. 29, it was necessary to enter port, clean fires, and prepare for the full-speed trial. The ship proceeded to Portland, Me., and anchored at 5:45 P. M. The four after boilers were cleaned, a load of fresh water taken from a tug-boat, and the ship ballasted with salt water.

Steam was raised in all 12 boilers.

At 1:30 A. M. on the morning of March 1, the Chester left port, and at 2:05 A. M. the full-power trial officially began. Bagged coal was used entirely on this run. The four main turbines were used, the cruising turbines running idly in a vacuum. The entire installation worked to perfection. No trouble was experienced with auxiliaries, except that the main feed-pumps were taxed beyond their capacity, and the auxiliary feed-pumps had to be used. The auxiliary feed-pump in No. 1 fire-room was in use most of the time, that in No. 2 fire-room was run slow a greater part of the time, and that in No. 3 fire-room kept in reserve.

The weather was clear and cold, with moderate west-north-westerly breezes, and the sea smooth.

The boilers supplied steam without effort; safety valves were set at about 262 lb., and steam necessary to maintain about 240 lb. at the turbines was kept from beginning to end. The firing interval used was 20 seconds.

The following statement shows the draught and displacement on leaving port, and at end of trial:

	Beginning.	End.
Draught, forward	16 ft. 4½ in.	15 ft. 7⅝ in.
Draught, aft	16 ft. 10¾ in.	16 ft. 9 in.
Draught, mean	16 ft. 7⅝ in.	16 ft. 2⅞ in.
Displacement	3731 tons	3583 tons
Estimated mean draught at middle of run (8 in. by the stern)	16 ft. 6 in.	
Corresponding displacement	3673 tons	

24-Hour Trial at 22.5 Knots.—Upon the conclusion of the full-power trial at 6:05 A. M., March 1, the Chester proceeded to Portland, Me., for water and for the purpose of cleaning boilers and otherwise preparing for the endurance and coal-consumption run at 22.5 knots. Owing to bad weather, departure was delayed until 10:14 A. M., March 3. The draught and displacement on leaving and at the end of run was as follows:

	Beginning.	End.
Draught, forward	16 ft. 11½ in.	15 ft. 9⅝ in.
Draught, aft	16 ft. 10⅞ in.	16 ft. 8⅛ in.
Draught, mean	16 ft. 11⅛ in.	16 ft. 2⅞ in.
Displacement	3835 tons	3596 tons
Estimated draught at middle of run	16 ft. 7¼ in.	
Corresponding displacement	3716 tons	

The contract contained a penalty clause in connection with this trial, as follows: "If the average speed of 22.5 knots cannot be maintained for the 24 hours' endurance and coal-consumption trial, it shall be optional with the secretary of the navy to reject her, or to accept her at a reduced price and upon conditions to be agreed upon; provided that if the coal consumed for all purposes on the 24 hours' endurance and coal-consumption trial give an endurance of less than 1.8 knots per ton of coal burned at the speed of 22.5 knots, or less than 1.6 knots per ton of coal burned at a speed of 23.5 knots, or less than a proportionate endurance per ton of coal burned at other speeds above 22.5 knots, deductions shall be made from the contract price at the rate of 15,000 dols. in each case for every 0.1 knot of endurance per ton of coal below the endurance required above."

At 10:44 A. M., March 3, the trial officially began. The weather was overcast

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and cloudy, with light airs to stiff breezes from N. N. E. to W. N. W., and a smooth sea. The following auxiliaries were in use. Auxiliaries in connection with the operation of the main engines, including two main feed-pumps, two dynamos, all hull-ventilating fans, evaporating and distilling plant, flushing pump, forced-draught fans, steering-engine, steam-heaters, one ice machine at 75 R. P. M., and the fresh-water pump as required. All 12 boilers were used under light air pressure. All steam from boilers was admitted to the intermediate pressure cruising turbine; the high-pressure cruising turbine ran idly in a vacuum. Turbines, boilers, and auxiliaries all worked most satisfactorily. Bagged coal entirely was used for the first 7 hours. Loose bunker coal used was kept track of as on 12-knot run. The firing interval was one minute.

The trial concluded at 10:44 A. M., March 4, and was followed by backing, helm, and steering-engine tests. These tests were also held at the conclusion of the full-speed trial, but were at this time repeated. With the vessel running at full speed ahead—about 24 knots—the telegraphs were thrown to "full speed astern," and the vessel became dead in the water in 2 minutes, 37 seconds. While running at full speed astern—about 250 R. P. M.—the telegraphs were thrown to "full speed ahead," and the vessel became dead in the water in about one minute.

STANDARDIZATION TRIAL DATA.

No. and direction of run.	Interval between middle of runs.		Average of elapsed times observed.		Mean revolutions per minute.	Speed in knots.
	min.	sec.	min.	sec.		
1 N.	..	....	5	18.75	251.88	11.2941
2 S.	17	6.3	4	33.35	242.88	13.1700
3 N.	20	2.5	5	18.45	251.07	11.3048
4 S.	*19	....	3	38.85	317.04	16.4496
5 N.	16	20.1	4	8.90	319.97	14.4637
6 S.	15	51.5	3	33.90	319.65	16.8303
7 N.	*13	....	2	30.95	545.06	23.8492
8 S.	12	5.7	2	17.75	542.43	26.1347
9 N.	12	11.1	2	29.65	546.69	24.0558
10 S.	12	46.8	2	17.30	545.83	26.2203
11 N.	13	21.7	2	30.50	545.87	23.9206
12 S.	*17	....	2	28.00	482.68	24.3240
13 N.	15	18.4	2	42.80	486.51	22.1133
14 S.	14	54.5	2	27.70	484 31	24.3734
15 N.	..	....	3	16.05	402.31	18.3627
16 S.	17	4.7	2	35.55	400.24	20.5304
17 N.	16	34.9	3	15.10	400.75	18.4519

*About.

With the helm hard over, at full speed ahead, a turning circle, estimated at 700 yards, was completed in 5 minutes 27 seconds, the initial angle of heel being 3.07 deg., and the permanent angle 1.8 deg.

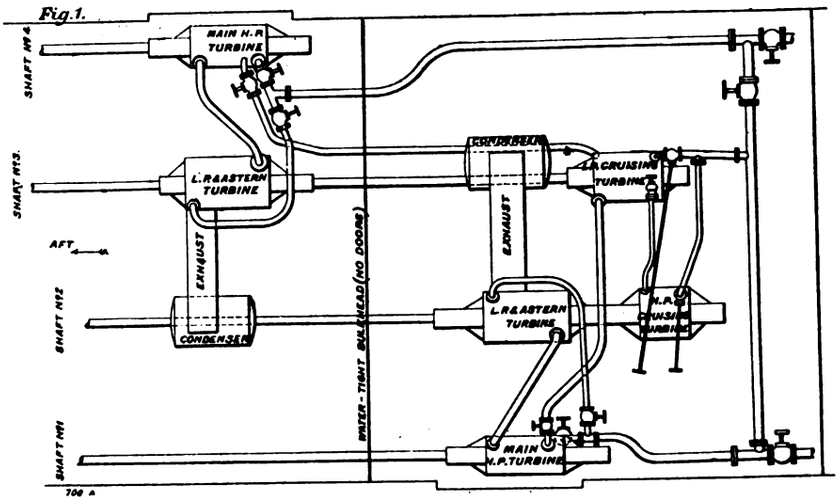
While backing full speed the highest steam pressure at astern throttle was 146 lb., giving about 400 revolutions; 120 lb. gave about 350 revolutions. With the inboard shafts backing at 400 revolutions the outboard shafts ran idly at nearly 200, and with the inboard shafts backing at 350 the outboard ran idly at about 150.

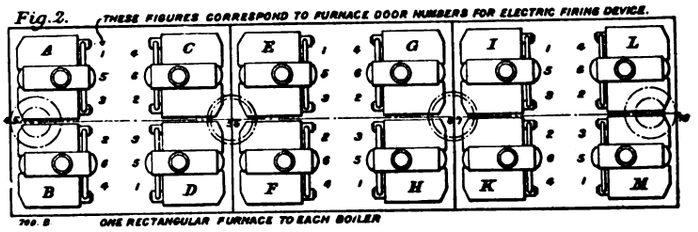
The average R. P. M. were 473.343; corresponding speed, 22.782 knots. The total coal burned was 193.54 tons—2.82 knots per ton of coal.

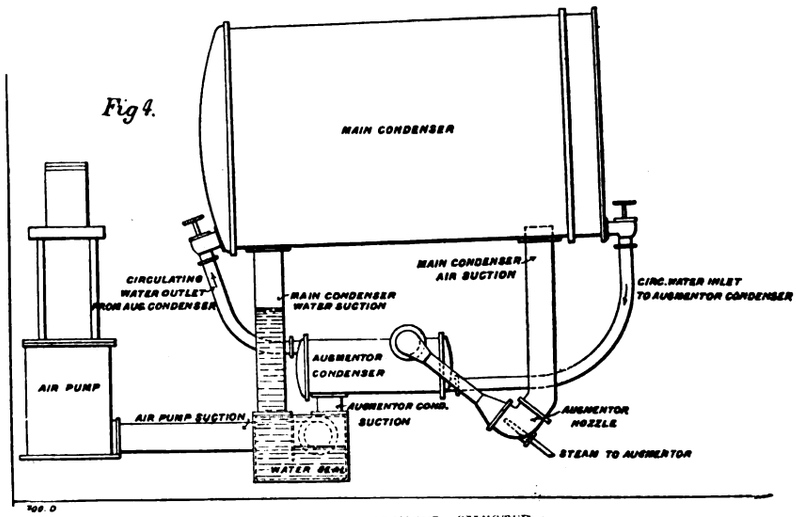
The vessel proceeded to Portland, Me., where the board of inspection and survey disembarked, after which she returned to the works of the builders, Bath, Me. The usual custom was observed of painting on the smoke-stacks the speed made at full power, and lashing brooms at the masthead and yard-arms. The greater part of the Bath population met the vessel at the dock, and a salute was rendered by them of twenty-six guns—one for each knot made—with a historic cannon belonging to the city.

GENERAL REMARKS ON THE MACHINERY INSTALLATION AND ON ITS MANAGEMENT AND OPERATION DURING THE TRIALS.

The management of the trial program and of the individual trials reflected great credit upon the builders. The efficient management of the vessel and machinery during the standardization trial is evident by a reference to the table giving the elapsed times between the middle of runs. A full share of credit should be given the boilers, as exhibited by the ease in maintaining steam throughout the trials and by the ease with which the vessel was brought up to her first full-speed run (No. 7 standardization run) of 25 knots, following a run at 15.5 knots (No. 6). As noted in the table, the interval between the middle of these runs was







SCOUT CRUISER CHESTER.

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13 minutes, of which several were spent in finishing No. 6 run and several included in No. 7 run. The interval in which increased steam was raised was therefore about 6 minutes. Attention is invited to the moderate air-pressures carried, as shown on data tables. A high-grade fire-room force was employed, which could have been little improved on. No attempt was made at reducing the complement by reason of the vessel being turbine-driven. The engineer complement was made up as follows: One chief engineer, 21 engineers, 18 oilers, six blower-oilers, six machinists, six messengers, four pump-men, three evaporator-men, two boiler-makers, one steam-heat man, one clerk, nine water-tenders, 49 firemen, 28 coal-passers, and 12 boiler-cleaners, arranged in three watches.

Vibration of turbines and hull were practically nil at all speeds, a slight tremor only being noticed in the after cabin at top speed—a propeller influence. Both the bow wave and stern wake were remarkably small. The only opportunity for observing the vessel's stability in a sea-way was between Bath and Charlestown, when fairly rough weather was encountered. At this time the period of a double roll was 13 seconds. The machinery weights were slightly under the limit of 798 tons, whereas the horsepower developed was much greater than the designed 16,000. The machinery compartments were never uncomfortably warm, though it must be remembered that the weather was cold and the ventilation especially efficient. The oil service worked most satisfactorily and bearing temperatures were in no case excessive. The coal used on the trial was Pocahontas, and samples of the lots used on the various trials were tested with the following results:

Selected Pocahontas Coal.	4-Hour test	24 Hours at 12 knots	24 Hours at 22.5 knots
Moisture	1.18	1.18	1.16
Volatile matter	19.50	20.14	20.21
Fixed carbon	75.78	75.54	76.03
Ash	3.54	3.14	2.60
Total	100	100	100
Sulphur	0.61	0.60	0.61
Heat value in British thermal units	14,740	14,830	14,896

Arrangements were made by the contractors for obtaining water consumption data by a system of measuring the feed-pump volumes, but as the data obtained were not considered reliable, they are omitted from these papers.

Post-Trial Examination of Boilers and Machinery.—Instructions were given the builders by the trial board upon the conclusion of the trials to have the boilers opened for complete inspection, all turbine-covers lifted, and other features of the installation prepared for post-trial examination in accordance with current practice. A report was made by the builders on March 7, that they would be ready on the 9th inst. The trial board arrived at Bath on that date. The examination showed the boilers to be in fine condition, a small amount of brickwork having been re-made, and the turbines and auxiliaries in excellent shape. Indications of blades having rubbed (in spots) were noticed in the four main turbines, but this was not sufficient to warrant anxiety or to necessitate other than slight reduction in tip clearances here and there. The journal-bearing bridge-gage clearances taken after trial were:

BRIDGE-CAGE MEASUREMENTS ON JOURNAL BEARINGS.

	In.
High pressure cruising, forward bearing.	0.018
High pressure cruising after bearing	0.027
Intermediate pressure cruising, forward bearing	0.032
Intermediate pressure cruising, after bearing	0.012
Starboard high pressure, forward bearing	0.038
Starboard high pressure, after bearing	0.010
Starboard low pressure, forward bearing.	0.022
Starboard low pressure, after bearing	0.021
Port high pressure, forward bearing	0.023
Port high pressure, after bearing	0.008
Port low pressure, forward bearing	0.019
Port low pressure, after bearing	0.002

Following the trials and this examination, work in connection with the final completion of the vessel for delivery to the government was begun. This consisted principally in laying linoleum, cleaning, painting, lagging, etc., and making good what few minor defects were noted, such as leaky valves, joints, etc. Journal bridge-gage clearances were taken, other such data collected, and stores assembled. The vessel was finished on April 23, 1908, and ten days before the expiration of the contract time, on April 24, she was taken to the Navy Yard, Portsmouth, N. H., and there delivered to Rear-Admiral Bicknell, U. S. N., the commandant of the yard.

The vessel was secured at the dock at noon, and at 2 P. M. the board of inspection inspected the vessel, finishing at 3:45 P. M. Promptly upon the conclusion of the inspection the ship was taken over and the engineer department relieved by a tentative organization. The ship was placed in commission at 10 A. M., April 25.

Description of Propelling Machinery.—The propelling turbines are in general as set forth at the beginning of the article, six in number, a high-pressure cruising, intermediate-pressure cruising, two main high-pressure and two low-pressure, with reversing turbines incorporated into the exhaust ends of each of the latter. The reversing turbines revolve idly in the exhaust casing of the low-pressure turbine when the engines are running ahead. The arrangement has been referred to in Fig. 1. As shown therein, they are located in two compartments separated by an athwartship, water-tight bulkhead. The inboard shafts turn outboard, and the outboard shafts turn inboard.

The turbine cylinders are parted horizontally in the plane of the shaft, and the two halves strongly bolted together. The lower half is cast with extensions forward and aft, box-shaped, for retaining the journal and thrust-bearings. The cylinders are supported by feet, certain of which are securely bolted to the foundations, and others have slotted holes for expansion. The feet are at a point directly under the journal bearings. The cylinders contain supports for the spindle and thrust-bearing brasses with oil-pockets, also the lower halves of spindle-glands, and have pockets under these glands for steam leak-offs. They have internal facings at their ahead steam ends for bolting on the dummies. Cylinder blading is caulked into grooves on the inside of the cylinder castings, these portions of the cylinders having been accurately bored and finished in a horizontal position. Hydrostatic tests were first applied to the cylinders, and subsequently a "baking" under moderate steam pressure for 48 hours to relieve internal stresses in the castings. The following table shows arrangement and dimensions of blading.

The rotors were statically balanced on two truly-levelled rails and the balance adjusted by removing metal, as necessary, from "chipping strips" left on the arms of the rotors for the purpose. The dynamic balancing was done by revolving the rotors under steam. At the same time dummy ring faces were worn down and bearings adjusted.

Stages.	Expansions.	Rows.	Heights. in.	Pitch. in.	Clearances. in.
High-Pressure Cruising.					
First	First	12	3/8	7/8	0.03
Second	Second	12	1/2	7/8	0.035
Third	Third	12	5/8	1	0.04
Intermediate-Pressure Cruising.					
First	First	15	1 1/8	1 1/4	0.04
Second	Second	15	1 3/8	1 1/4	0.04
Third	Third	15	1 3/4	1 5/8	0.045
Main High-Pressure.					
First	First	12	7/8	1 1/4	0.03
Second	Second	12	1 1/4	1 1/4	0.035
Third	Third	12	1 3/4	1 5/8	0.04
Fourth	Fourth	12	2 1/2	1 3/4	0.045
Fifth	Fifth	12	3 1/2	1 7/8	0.05
Sixth	Sixth	10	5	1 13/16	0.05
Main Low-Pressure.					
First	First	5	2 1/2	1 5/8	0.055
Second	Second	5	3 1/2	1 3/4	0.06
Third	Third	4	5	1 13/16	0.07
Fourth	Fourth	3	7	1 3/4	0.08
Fourth	Fifth	3	7	1 13/16	0.08
Fourth	Sixth	4	7	2 5/8	0.08
Fourth	Seventh	4	7	2 5/8	0.08
Astern Turbines.					
First	First	6	1/2	1 1/8	0.045
Second	Second	6	1	1 1/8	0.05
Third	Third	6	2	1 1/8	0.06
Third	Fourth	6	2	1 1/2	0.06
Third	Fifth	6	2	1 1/2	0.06

The blades were installed in accordance with the Parsons system. They were cut to length, saw-cuts made where required for binding, caulking grooves stamped into the base of the blades, all done by the same machine, and the blades then caulked into place. Caulking strips having curves corresponding to the blades were cut to length and placed alternately at the base of each blade. The blades and caulking strips were alternately tightened into the groove by means of a caulking tool, after which the binding wire was inserted and the lacing put on around binding wire and blades with silver sold-

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er. Blades were turned up in the vertical line before the insertion of the binding wire, and were finally filed up to remove burrs.

The blades are of a composition consisting of 72 per cent copper and 28 per cent zinc, the caulking strips 63½ per cent copper and 36½ per cent zinc, the binding strip 72 per cent copper and 28 per cent zinc, and the lacing wire pure copper. Blades having binding strips are soldered to the latter with a silver solder. Steam-supply and exhaust piping is as shown on Fig. 1. In the exhaust-pipe from the high-pressure cruising to the intermediate-pressure cruising turbine, and in the two exhaust-pipes from the intermediate-pressure cruising to the main high-pressure turbines, spring-loaded, self-closing valves are installed to isolate the cruising turbines while running at higher rates of speed and while maneuvering. A 3½ in. spring-relief valve for the high-pressure cruising turbine is installed in its exhaust-pipe, set at 125 lb., and one for the intermediate-pressure cruising turbine is installed on the after end of its upper casing, set at 160 lb. A governor, arranged to pull out a pawl and close a butterfly valve in the main steam-pipe is fitted on each shaft, the object being merely to shut down automatically in the event of accident. An unusual feature in piping is the low-pressure exhaust-pipe, which is an elbow-pipe rectangular in cross-section, 3 ft. 9 in. x 4 ft. 6 in. and of ⅜-in. steel plate. The dummies in the steam ends of the turbines for preventing steam from leaking from the steam belts direct to the inside of the drums consist of a series of rectangular grooves in the spindle-wheels, against the side of each of which a brass strip lies closely without touching. These brass strips are caulked into an annular iron casting made in halves and bolted to the inside of the cylinder. A micrometer for measuring the opening of dummies between brass strips and running steel faces is fitted on each cylinder. Steam glands are fitted around the turbine spindles at the cylinder ends, packed with labyrinth stuffing-boxes. These glands are to obviate, in the case of high-pressure turbines, the leakage of steam from the casings, and in the case of the low-pressure turbines, the leakage of air from the atmosphere into the casing and thence to the condenser. There are rows of brass strips let into the shaft and the cast-iron gland-sleeve, with thin edges just clearing the opposite member. Snap-rings of composition H are fitted at the outer end of each gland-box, and just inside of these rings connection is made with an equalizer pipe joining all similar pockets, and a valve is provided from auxiliary exhaust line for maintaining the pressure in this pipe. Strainers of the basket type, in accordance with current turbine practice, made with bodies and covers of composition G, and with strainerbaskets of sheet brass, are installed, one in the live-steam supply to each turbine, and one in the auxiliary exhaust connection to the second expansion of the main high-pressure turbines and the low-pressure turbines. A system of guide-rods is installed for lifting the turbine-casings, one on each of the four corners, placed vertically and graduated in inches, to permit of the even lifting of the covers. Special portable guides are supplied for guiding the spindles when lifting them, to prevent the stripping of the blades. Turning-gear is fitted at the after-end of each turbine for turning it by hand. It consists of a worm-wheel on the shaft, meshing with a worm operated by a ratchet-wrench. Suitable lifting-gear is provided for lifting casings, spindles, etc., consisting of overhead trolleys on frames, with chain-falls and slings. The turbine cylinder data are as follow:

Cylinder	Diam. of Rotor Drum. in.	Length of Rotor Drum. in.	Diameter of Cylinder for each Stage. 1st. in.	2nd. in.	3rd. in.	4th. in.	5th. in.	6th. in.	7th. in.
H. P. cruising	60	36	60¾	61	61¼	—	—	—	—
I. P. cruising	49	60.5	51¼	51⅞	52.5	—	—	—	—
Main H. P. port	42	103.5	43¾	44.5	45.5	47	49	52	—
Main H. P. starboard	42	103 5	43¾	44.5	45.5	47	49	52	—
Main L. P. port	65	53⅛	70	72	75	79	79	79	79
Main L. P. starboard	65	53⅜	70	72	75	79	79	79	79
Astern, port	50	43	51	52	54	54	54	—	—
Astern, starboard	50	43	51	52	54	54	54	—	—

Shafting and Shaft-Bearings.—The shafting is of Class A forging, and is solid. The thrust-shaft is on the spindle ends. The stern-tube shaft and the propeller shaft are in one piece; inboard sections 48 ft. 3 in. long, and outboard lengths 46 ft. 9 11/16 in. long, in both cases 8½ in. in diameter. The line shafting is 8 in. in diameter. There are two shaft-bearings to each turbine—twelve in all, those for the cruising turbines being 10 in. long, and those for the main turbines 15 in. The bearing-shells, of brass, are semicircular, and are lined with white metal. Broad strips of the bearing-shell are exposed slightly below the line of the white metal to catch the spindle in case the white metal gives out. The bottom half can be rolled out without lifting the spindle; the top half will lift off. These bearings are lubricated by oil supplied under pressure. There are six thrust-shaft bearings, those for the cruising turbines having eight collars and rings, and those for the main turbines fifteen collars and rings. These bearings are so constructed that the longitudinal position of the shaft and the dummy clearance can be readily adjusted. The thrust-bearings are in two halves. The steam balance is so arranged as to be practically equal to the thrust of the propeller at all speeds. The thrusts are lubricated by oil under pressure. Oil supplied to thrust-bearings and journal-bearings is collected in a chamber in the box ends of the lower cylinder castings, and drains by gravity into a return pipe. There are fifteen line-shaft bearings, each 12 in. long lined with white metal, and with ends provided with oil-baffles; provision is made for their lubrication by oil under pressure. Water service to a jacket around the oil-chamber is provided only in case of line shaft bearings; the water-service pipe discharges into stern-tube stuffing-box, and has a branch pipe for draining the latter. Water service by hose can be provided in emergency. Stern-tube bearings for each shaft consist of a bearing in each end of the tube in each case. They are each 51¾ in. in length. Each shaft also has one strut-bearing, 51¾ in. in length, and fair-water sleeves are fitted on the forward side of the strut at one end, and on the after side of the stern-tube at the other. There are sixteen bulkhead stuffing-boxes where shafts pass through water-tight bulkheads.

An expansion coupling is fitted between each low-pressure turbine and the cruising turbine on the same shafting. The forward end of each low-pressure turbine shaft is built with twelve teeth, which engage with a slotted collar bolted to the flange coupling on the after end of the cruising-turbine shafting. This permits of disconnecting the cruising turbines, as well as of expansion. As but slight increase of efficiency is gained by disconnecting, this is not done as a rule, the cruising turbines being run idly in a vacuum when not in use.

Propellers.—There are four solid, true-screw, manganese-bronze propellers, each having three blades: diameter, 6 ft.; pitch, 6 ft.; area, projected, 17.02 sq. ft., helicoidal, 19 sq. ft., disc area, 28.27 sq. ft.; immersion of upper tip of blade, 69½ in. inboard, 57½ in. outboard. The driving surfaces of all propeller blades were made a true surface by machining. The wing propellers are ahead of the inner propellers, and the former turn inboard, and the latter outboard, though it was originally intended that all four should turn outward.

Main Condensers.—There are two main condensers—one in each engine-room—located inboard and abreast of each low-pressure turbine. They are horizontal and cylindrical, of the surface-condensing

(Continued on page 26.)

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THOSE TRAMP COLLIERS.

A comparison of the declared intention of the United States government to protect and foster the American merchant marine and the policy of the navy department in chartering vessels to deliver navy coal on the Pacific coast under such terms as have ruined the American shipping interests on the western ocean, indicates a degree of crass stupidity and ignorance of conditions excelling in idiocy the whole series of exasperating blunders which our government has perpetrated against American ocean shipping.

Pacific coast shipping is greatly depressed at the present time. Everywhere American vessels are idle or are running at a loss; two 10,000-ton liners formerly engaged in regular trade between Puget Sound and the Orient have been offered for sale; charter rates are at the lowest point in years and are very unstable; ship yards are operating at 10 or even 5 per cent of their normal output. Although the total volume of deepwater shipping on the Pacific will only be 15 per cent less this year than last, due to the financial depression, the American lines are in every case doing practically no business. Why?

Because when it was decided to send the American battleship fleet to the Pacific the navy department chartered foreign colliers having a gross capacity of 225,000 tons, sent them to the Pacific coast and there turned them loose. Left to get back to the Atlantic as best they could, they accepted cargoes at almost any old price and the ruination of American shipping on the Pacific has resulted.

The battleship fleet has left for Australia but the big cruiser fleet remains and will remain on the Pacific coast indefinitely. It is a large consumer of coal and the stream of foreign tramps started this way still continues. Twelve ships aggregating 75,000 tons are on the way now; four more with a total net tonnage of 13,131 were chartered in September. Meanwhile American lines are selling their ships, American ship yards are idle and the Japanese are rapidly getting a strangle hold on the splendid commerce of the Pacific. Is there any remedy to this state of affairs? Yes.

Three remedies are feasible. The department *can* obtain good steam coal on the Pacific coast. Coal is being furnished from the Seattle bunkers to steamships engaged in the coastwise and Alaska passenger trade, which vessels maintain a speed of from 16 to 23 knots an hour, for $3.75 per ton. To furnish its cruiser fleet, which seldom steams over 8 or 10 knots an hour, the government is paying $9.15 per ton for Atlantic coast coal laid down in Pacific harbors and is ruining American shipping on the Pacific in the bargain. If the navy is not satisfied with coal good enough for some of the fastest steamships on the Pacific ocean it can obtain coal averaging a little lower in ash from British Columbia at $4.75 per ton delivered to the navy yard, Puget Sound. If the department is still unsatisfied and demands Atlantic coast coal it can charter its foreign colliers for the *round voyage* and not turn them loose to prey upon Pacific coastwise and deep water commerce.

These facts have been forcibly and repeatedly brought to the attention of the navy department without obtaining a change of policy. The most important commercial bodies, prominent vessel men, members of commerce and influential citizens on the Pacific coast have protested against the department's present policy in vain. To these protests the secretary of the navy replies that, "he regrets that the department cannot obtain American colliers but that practically none were offered even at a 50 per cent advance in rates." We know the department cannot obtain American colliers because, to our shame, they do not exist. But in his reply the secretary ignores entirely the real point at issue; either that the department cease its present policy of chartering foreign bottoms for one way and charter them for the round voyage or that it get its navy coal on the Pacific. This point has been stated very plainly to the secretary and his subordinates; only ignorance of the deplorable conditions existing on the Pacific or stupid neglect can account for the continuance of the present pernicious charter system. This system must be altered or American ships will be swept entirely from the deep sea commerce of the Pacific ocean.

JAPANESE RECEPTION OF ATLANTIC FLEET.

The Atlantic battleship fleet arrived at Yokohama Oct. 18 and was given a very demonstrative welcome by the Japanese, the American fleet being met in the bay by the Japanese fleet which convoyed the visitors, ship for ship.

The extent of the efforts to make the stay of the fleet in the Japanese port memorable may be estimated when it is learned that not even the great Japanese Admiral Togo himself received a greater ovation after the victory over Russia. Delay of the fleet by typhoons caused an elaborate program to be somewhat curtailed, but everywhere it was apparent that the nation has made a great effort to express its good will to the Americans.

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PIG IRON SITUATION.

The promise of early ordering of steel rails and equipment by the Pennsylvania railroad, an unusually large transaction in basic pig iron calling for 350,000 tons covering a period of five years, and some increase in the purchase of structural material by railroads and others have been the particular bright spots in the week's situation. Other pig iron purchases from 2,000 to 12,000 tons each have helped considerably, and founders are taking iron on old contracts promptly. About 65,000 tons of structural steel will soon be contracted for in Chicago, besides a large number of orders ranging from 1,000 to 5,000 tons in various cities throughout the country. The other finished material demand is only moderate. The drouth continued in the coke regions has resulted in slightly higher prices for coke.

MEETING OF SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS.

The 16th general meeting of the Society of Naval Architects and Marine Engineers will be held in Assembly room No. 1, Engineering Societies building, New York, Thursday and Friday, Nov. 19 and 20, 1908, and will begin at 10 A. M. each day. The society's rooms will be open for the use of all members, and the usual conveniences provided. The telephone call will be 4,600 Bryant.

There will be a banquet in Delmonico's large hall at 7 p. m. Friday, Nov. 20, to which all members and their guests are cordially invited; tickets are $5 each, and seats can be engaged in advance or at the meeting.

The council will meet at 3 P. M., Wednesday, Nov. 18, in the council room, No. 716, seventh floor, Engineering Societies building.

Proposals for membership should be mailed so as to reach the secretary on or before Nov. 18; blank forms of application will be furnished by the secretary when requested.

A list of the papers expected to be read during the meeting is given on the following pages; preliminary copies of those received sufficiently in advance from the authors will be mailed to members in good standing to permit full discussion.

Very respectfuly,

WM. J. BAXTER,
Secretary-Treasurer.

PAPERS TO BE READ.

Thursday, Nov. 19, 1908.

1. "The War Eagle," by Charles H. Cramp, vice president.
2. "Practical Methods of Conducting Trials of Vessels," by E. A. Stevens, vice president.
3. "The Influence of Midship Section upon the Resistance of Ships," by Naval Constructor D. W. Taylor, U. S. N., vice president.
4. "Further Experiments upon Longitudinal Displacement and Its Effect upon Resistance," by Prof. H. C. Sadler, member.
5. "Further Analysis of Propeller Experiments," by Clinton H. Crane, associate.
6. "Deviation of the Compass Aboard Steel Ships; Its Avoidance and Correction," by Lieut. Com. L. H. Chandler, U. S. N., member.
7. "The Influence of Free Water Ballast upon the Stability of Ships and Floating Docks," by Naval Constructor T. G. Roberts, U. S. N., member.
8. "Recent Inventions as Applied to Modern Steamships," by W. Carlile Wallace, member.

FRIDAY, NOV. 20, 1908.

9. "Service Test on the S. S. Harvard," by Prof. C. H. Peabody, member of council.
10. "Trials of the U. S. Scout Cruiser Chester fitted with Parsons Turbines," by Charles P. Wetherbee, member.
11. "Some Remarks on the Steam Turbine," by J. W. Powell, member.
12. "Ship Building on the Great Lakes," by Robert Curr, member.
13. "The Steamer Commonwealth," by J. H. Gardner and W. T. Berry, members.
14. "Fire Boats," by Charles C. West, member.
15. "Sea-Going Suction Dredges," by Thomas M. Cornbrooks, member.
16. "The British International Trophy Race of 1908," by W. P. Stephens, associate.
17. "Transportation of Submarines," by Naval Constructor W. J. Baxter, U. S. N., member of council.

COASTWISE COMPANIES RESIST.

The question as to whether the Interstate Commerce Commission has jurisdiction over steamship lines doing a coastwise business was the subject of argument before the commission Oct. 16. The carriers concede that the commission has jurisdiction over shipments which go partly by rail and partly by water in cars and boats owned by the same corporation, but they contend that it has no jurisdiction over shipments which originate at the water's edge and are discharged at their destination at the water's edge.

The commission in a ruling made last May held that it did have jurisdiction over such traffic and went further, holding that a steamboat line not owned by a railroad company could not unite with a rail carrier in making a through rate without subjecting all interstate traffic to the provisions of the law and to the jurisdiction of the commission.

Argument was made by Attorneys Alfred B. Thacher, D. M. Kayne, Sidney F. Andrews and Frank S. Masten on behalf of 20 odd steamship companies. They urged that the Hepburn act was intended for the regulation of railroads and that throughout the entire act reference is continually made to switches, spurs, tracks, yards, sidings, cars, grounds, depots, etc., a nomenclature which shows at what congress was aiming. Not a single reference is made to piers, wharves, offices, vessels or other facilities used by water routes, the attorneys said, and if congress had intended to cover water transportation used in a bona fide way in connection with railroads it could not possibly have overlooked using the name of such water properties.

The commission was also informed that the ruling complained of is unwarranted by the language of the Hepburn act and is opposed to public policy.

"The water carrier is already freighted with regulation and restriction almost to the sinking point," said Attorney Thacher, "but the public tendency is now to enlarge the policy of fostering the merchant marine by removing and not adding restrictions, and the people are asking for open and unobstructed water transportation with its natural competitive benefits."

The steamship companies represented at the argument include the Hudson Navigation Co., Hudson River Day Line, Central Hudson Steamboat Co., Pacific Coast Steamship Co., Merchants' & Miners' Transportation Co., Baltimore & Philadelphia Steamboat Co., Old Dominion Steamboat Co., Clyde Steamship Co., Southern Pacific Co., Baltimore Steam Packet Co., Norfolk & Washington Co., New England Navigation Co., Hartford & New York Transportation Co., Brunswick Steamship Co., New York & Cuba Mail Steamship Co., New York & Porto Rico Mail Steamship Co., Southern Steamship Co., Metropolitan Steamship Co., Red D Line, New York & Baltimore Transportation Co., American Hawaiian Steamship Co. and the Plant Line. The executive committee of the Association of Passenger Steamboat Lines was also represented.

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LAKES TO THE GULF DEEP WATERWAYS ASSOCIATION.

(Continued from Oct. 15.)

Resolutions adopted by the association were as follows:

"This, the third lakes to the gulf deep waterway convention, the largest convention ever assembled in the United States, including some 4,000 delegates from 44 sovereign states of this union, representing the commercial, agricultural, manufacturing and mercantile interests of the entire Mississippi valley, and having deeply in mind and at heart the prosperity and welfare not only of the people of the Mississippi valley, but of the whole nation, and realizing that the moral and spiritual stamina and growth of the nation as a whole depends upon the material welfare and prosperity of the individual citizen, do hereby

"Resolve and declare, To promote the 'general welfare' is recognized by the constitution of the United States as one of the fundamental principles of government.

"The general welfare of the people of the United States can best be promoted by establishing the commerce of the country on a sound basis and by so enlarging it that agricultural and mineral resources may be developed to the end that production and manufacturing may be encouraged and that all other lines of independent business may be increased.

"Easy and adequate transportation, effective between producer and consumer and for carrying the abundant product of the country to the seaboard for shipment abroad, is the first essential for the development of the commerce of the United States, and the responsibility for this development rests on the general government.

"It has been demonstrated during the past 10 years that when business conditions in the United States are normal the transportation facilities afforded by the railways are utterly inadequate, and it is stated by the great traffic managers of the railways that the development of railway facilities cannot keep pace with the increased demands upon them. The leading railway authorities, including prominent officials of all the great lines which parallel the Mississippi, declare that water transportation must be developed to supplement the railways in order that the freight of the country may be handled properly and promptly.

"Under the constitution the regulation of commerce between the states devolves on the general government, and under those decisions of Chief Justice Marshall, which are universally accepted as our best interpretation of constitutional powers, the control of waterways and the regulation of navigation also rest with the general government, and neither states nor private capital can be permitted under the constitution to assume these duties.

"The duty, therefore, devolves on the general government to give to the country adequate transportation facilities by developing the navigable waterways of the country into complete freight carrying usefulness. This duty should be recognized by the congress at once, and the waterways should be made efficient freight carriers, otherwise the United States cannot maintain commercial equality with those other nations of the world now equipping their waterways as freight carriers and considering their railways and waterways as complementary agencies; and in no other way can this country derive benefits equaling those of other countries from the building of the Panama canal.

"The all important question of transportation is a paramount issue. If it be found that the current revenues of the government are insufficient for carrying out vigorously and on a broad plan the development of our waterways, the congress should secure funds for that purpose by providing a sufficient bond issue.

"The interior valley comprises approximately half the area of the United States. It is 2,500 miles in length and 2,000 miles in width. Within its boundaries lie the greatest producing states of the Union. The areas of this great river system form the boundary lines of 21 states and over 20,000 miles of possible navigation. This vast valley produced three-fourths of our foreign exports.

"Within this valley live half the people of the entire United States and the voice of its citizens must be heard.

"The foreign commerce of this important portion of the United States should go direct in American bottoms to foreign ports. Harness the rivers of this fruitful valley and we shall have a clear and effective means of transportation, and a mightier impetus will be given to the ship building industry than could be given by any subsidy other than the moderate expenditure required for the permanent betterment of channels.

"This convention does, therefore, declare the opening of a deep channel way connecting the great lakes on the north with the gulf of Mexico on the south to be an imperative duty of the general government, and that this work should be immediately begun and completed as speedily as possible.

"Any plan for the inland waterway development so imperatively necessary to the rational welfare of the valley should comprise a main trunk line in the form of a strait connecting Lake Michigan with the Gulf of Mexico by way of the Illinois and Mississippi rivers. The development of this trunk line should begin at once. The improvement of the branches of this main line, such as the upper Mississippi with its tributaries, the Ohio with its leading tributaries, including the Tennessee and Cumberland, the Missouri, the Arkansas, the Red, the White, and other rivers, and the interstate inland waterway of Louisiana and Texas, should proceed simultaneously with the development of the principal line.

"The deep waterway is practically complete from Chicago to Joliet through the courage and enterprise of the single city of Chicago, which has, by the expenditure of $55,000,000, created a deep waterway across the main divide between the waters of Lake Michigan and those of the Mississippi. A special board of survey, composed of United States engineers, reported to congress in 1905 that the continuation of the deep waterway from Joliet to St. Louis was feasible and would cost only $31,000,000. The state of Illinois, assuming that the federal government will take the responsibility of completing the waterway to the gulf, is about to co-operate to the extent of $20,000,000.

"The delegates to this convention heartily congratulate the great commonwealth of Illinois and the splendid city of Chicago on their initiative, and express the hope and believe that their example will influence other states and lead to similar effective co-operation.

"A special board of survey, composed of United States engineers, was, through the efforts of this association, created by congress last year to survey the deep waterway route from St. Louis to the mouth of the Ohio and to report to congress the feasibility and cost of the waterway. That board will report during the winter, and we the delegates to this convention demand that when this report is made congress shall at once provide funds

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sufficient to begin operations in a large and effective way.

"The broad plan for improving all the waterways for navigation should take account of all other uses of waters and benefits to be derived from them by the people, should consider the conservation of the natural resources of the country in their relation to commerce and navigation, should extend to forest preservation, reservoirs, and other means of stream control, and the maintenance of the level of our great lakes in such a manner as not to interfere with their navigation and commerce, and should consider floods and their prevention, together with irrigation and drainage. They should take account of bank revetment, levee building, and other means of protecting the bottom lands and increasing their productivity, and should contemplate regulation of terminals with a view to rendering rail transportation and water transportation complementary and jointly useful to the people of the country.

"This convention is in hearty accord with the movement for the conservation of the natural resources of the country, and heartily approves the efforts of the national rivers and harbors congress in seeking to develop the waterways of the nation.

"Fully realizing the importance of the proposed constitutional amendment unanimously submitted by the legislature of the state of Illinois to be voted on Nov. 3, and recognizing in it a practical step in the direction of the realization of this project, and also recognizing in it the first great movement by any state in the matter of the conservation of its natural resources, we approve said constitutional amendment and commend it to the favorable consideration of the voters of Illinois.

"We, the delegates to this convention assembled, representing half the people and three-fifths of the productive energy of the United States, do hereby demand that a definite and vigorous policy of waterway improvement, beginning with the lakes to gulf deep waterway, be promptly adopted and put into operation by the national government.

"To the enforcement of this demand we pledge our individual effort and our united support, and we pledge our personal honor, each for himself and to each other, to support no candidate for public office who will not unqualifiedly indorse and maintain that policy."

In a written address "not down on the program," James J. Hill sent a message of warning to the delegates in attendance at the lakes-to-gulf deep waterway convention. His message of 4,000 words was received unexpectedly and was read from the manuscript to the delegates in his absence. It pointed out the dangers of "too much enthusiasm in the matter of appropriation of public moneys for the waterways." Attention was called to the number of such issues already before Congress.

Mr. Hill maintained that pledging the national credit to unheard of amounts would be a reckless, foolish and almost criminal policy and that it might plunge the nation into bankruptcy. He dealt with the mutual interests of rail as well as water transit in a vast system of internal highways. His view was largely a business one. In the project he saw great benefits, and he also saw dangers. The paper among other things said:

"Federal powers and the force of public opinion have been enlisted to prevent the future waste of the nation's resources. Now, one resource, among the mightiest of all, has not been included in the list, because it is not material, but intangible.

"I refer to the national credit; that potent force to which we appeal in times of war or other great national crises, and which should be reserved for issues of national life and death.

"I need not remind you that our public credit, though vast, is not inexhaustible. Many of us have seen the day when it was strained to the breaking point. None of us knows when we may need again to rely upon it, and when its strength or weakness will determine whether the nation will live or die.

"Of all our resources, perhaps, this one should be guarded with most jealous care, first, because of its relation to national existence, and second because we can never know in advance where exhaustion begins.

"Some of the more enthusiastic advocates of waterways have made the mistake of urging that the national credit be pledged to unheard of amounts in order that we may complete the whole work at once. It is a reckless, foolish and, I may almost say, a criminal policy.

"One bill before Congress recently proposed to appropriate at once $50,000,000 for the work, and authorized the President, whenever the funds in hand fell below $20,000,000, to sell bonds enough to raise them again to $50,000,000, and repeat this process indefinitely.

"This would take the limit off altogether and make the waterway expenditure equal to the pleasure of the executive and the power of the nation to borrow.

"Others have proposed total appropriations ranging from $500,000,000 to $1,000,000,000, the money to be obtained by issue of bonds to that amount.

"If we once embark on this policy in national affairs, where the connection between the appropriating power and the tax collector is so loose and little realized, we shall scarcely stop short of national bankruptcy.

"What has happend to our forests will befall our credit and the nation be left stripped of her last defense against the day of possible extremity."

Mr. Hill then pointed out these essentials for developing the highest possibilities of a deep waterway.

"First, a permanent commission authorized to expend appropriations in its discretion upon national waterways in the order of their importance. Then, secondly, a comprehensive plan, including also such reservoir and slack water work as may be required for the working out of each project to success. This plan in its essentials to be adopted by the commission at the outset and adhered to without interference by Congress or any department.

"Next an insistence upon the development of trunk lines first of all, and upon a depth that will make them real carriers of commerce, able to aid the railroads in their task and transport bulky freight expeditiously and economically.

"Finally, a liberal standing appropriation annually for the commission's work, until its plan shall have been carried out over the whole country, and a refusal to ask the pledge of the nation's credit for a single dollar of this, which is properly our work."

BARGE CANAL WORK AT NORTH TONAWANDA.

The Great Lakes Construction Co., of Buffalo, N. Y., which has the contract for the new barge canal work at the Tonawandas, has begun the construction of the big concrete walls which are to form the boundaries of the harbor at North Tonawanda between the New York Central railroad bridge and Ellicott creek.

The walls are to be 20 ft. in height. Cofferdams will first be erected to facilitate the work of construction, and it is expected that at least six months will be required to complete the walls.

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STEAMSHIP COMBINE DECISION.

A development of unusual interest to the steamship business is the decision of the United States circuit court of appeals made public recently. This decision reverses the action of Judge Hough, in the United States district court, in throwing out the case of the Thomsen Steamship Co., Hugo Adelberto Thomsen, and others, against the so-called South African "shipping ring," composed of the Union Castle Mail Steamship Co., Prince line, American and African Steamship line and others.

While the decision does not sustain the claims of the plaintiffs, the court holds that they are entitled to their full day in court. In other words, the case will now be tried on its merits.

The principle invoked is that of the rebate system to "loyal" shippers; that is, where a shipper patronizes the conference lines exclusively for six months, at the end of that time he receives a 10 per cent rebate on the amount of freight charges paid.

Judge Hough in dismissing the Thomsen suit for damages held that as the combination was formed in England an American court was without jurisdiction under the Sherman anti-trust act; that plaintiffs went into competitive business while the combination was in existence, did so with their eyes open and, therefore, were not entitled to recover damages. The circuit court of appeals decides all these points in favor of the plaintiffs.

The decision, written by Judge Noyes and concurred in by Judges Lacombe and Coxe, says:

"The plaintiffs brought action for the recovery of treble damages under the seventh section of the federal anti-trust statute. The case came to trial and the plaintiffs put in a part of their testimony when, over their objection, the trial court dismissed the complaint.

"In determining whether there was error in this action it must be assumed that the plaintiffs, had they been permitted to proceed, would have established that which they alleged, unless negatived by their evidence or admissions upon the trial.

"The complaint alleges, in substance, that the defendants were engaged as carriers in the South African trade and entered into a combination in restraint of foreign trade and commerce in violation of this act by means of a scheme under which they united as 'The South African Lines,' fixed rates and shut off outside competition by requiring shippers to pay a percentage in addition to a reasonable freight rate which they should receive back in case—and only in case—they refrained from shipping by other lines. The evidence shows the existence of a 'conference' for the purpose of fixing and maintaining rates and a return 'commission' to 'loyal' shippers.

"The manifest purpose of the combination was to prevent competition between members by maintaining uniform rates and to eliminate the possibility of competition with other lines by requiring shippers to pay that which was equivalent to forfeit money.

"The combination being in restraint of competition in foreign commerce was in contravention of the federal anti-trust statute. As said by the supreme court of the United States in National Cotton Oil Co. vs. Texas in speaking of the purposes of the federal and state statutes against combinations: 'According to them, competition, not combination, should be the law of trade. If there is evil in this it is accepted as less than that which may result from the unification of interests and the power such unification gives.'

"And if there be any exception to the rule that the purpose of the statute is to preserve competition it will not be found in a combination of carriers which not only eliminates competition among themselves, but attempts, in the manner shown in this record, to prevent outside competition.

"Whether the restraint of trade imposed by the combination was reasonable or unreasonable is, under repeated decisions of the supreme court, immaterial.

"Whether the combination was entered into before or after the plaintiffs commenced to do business is equally immaterial. The statute applies to continuing combinations. It is as unlawful to prevent a person from engaging in business as it is to drive a person out of business.

"That the combination was formed in a foreign country is likewise immaterial. It affected the foreign commerce of this country and was put into operation here.

"The complaint, therefore, states an unlawful combination, a thing 'forbidden or declared to be unlawful' by the act. And the remaining question is whether the plaintiffs were thereby injured in their business or property.

"The complaint alleges, in substance, that the plaintiffs were coerced by the unlawful combination into paying a sum in addition to a reasonable freight rate which was held practically subject to forfeiture in case the plaintiffs shipped by other lines or their consignees received freight by other lines.

"These are allegations of injuries inflicted by the combination. If the plaintiffs were coerced into paying sums of money in excess of reasonable rates which were held for the very purpose of preventing that competition which the statute is designed to promote, they were damaged, within the meaning of the statute, to the extent of the sums so paid.

"Moreover, the complaint contains general allegations of damage which we do not find to have been withdrawn upon the trial.

"It may be that the plaintiffs will be unable to establish the essential elements of the claims for damages which they set up. But they are entitled to their opportunity—to their full day in court."

BOYCOTTING AUSTRIAN LLOYD.

The Austrian Lloyd Steamship Co. is experiencing considerable difficulty in operating its services to Turkish ports since the situation in the Balkans has become so acute. A boycott has been established not only against goods carried under the Austrian flag but against Austrian goods of any description shipped in other vessels.

The Austrian foreign minister has instructed the ambassador at Constantinople to present a formal protest to the Porte, and the Austrian chamber of commerce have appealed to their government to prevent the loss of the markets of Germany.

SHIP YARD NOTES.

Pelly's Dry Dock at South Brooklyn, N. Y., was the scene of an unusual repair job last week when the bark St. Croix was stripped, caulked and remetaled.

The Sharptown Marine Railway, Sharptown, Md., recently launched a 200-ft. sea-going barge for the P. Dougherty Co., of Baltimore, for use in the coastwise lumber trade.

The Staten Island Ship Building Co., Port Richmond, Staten Island, N. Y., launched the tug Mary F. Scully, building for the Scully Towing & Wrecking Co., of New York, on Saturday, Oct. 17. The new tug is the largest ocean-going tug boat in existence, being 180 ft. long, 30 ft. beam and drawing 15 ft. of water. She is to have triple expansion engines which

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will give her a speed of about 15 knots and will carry 500 tons of coal, giving her a steaming radius of about 5,000 miles. The Scully is to be equipped with wireless telegraph apparatus and a powerful searchlight.

The Erie Basin Dry Dock, Brooklyn, N. Y., has the Norwegian steamer Antonio Lanasa at its plant for repairs to damages sustained in the recent West Indian hurricane when the steamer was driven ashore on the Cuban coast.

The Heffernan Dry Dock Co., Quartermaster Harbor, Wash., has the United States cable steamer Burnside at its plant for quite extensive repairs and alterations. She requires considerable ship work and will also receive a new shaft and propeller.

Percy & Small, Bath, Me., will soon launch the six-masted schooner Edward B. Winslow, building for J. S. Winslow & Co., of Portland, Me. A five master for William F. Palmer, of Boston, Mass., is also nearly ready to go overboard.

The Union Iron Works, San Francisco, Cal., is repairing the oil tank steamer Roma, owned by the Union Oil Co., of San Francisco. She went on a reef while bound to San Francisco from Port Harford, and has 12 damaged plates. The cost of repairs is $17,000.

A well-known Pacific coast firm of not be commenced until the result of the coming presidential election is known. If William H. Taft is elected the owners will direct that the construction of the vessel proceed at once, while if Bryan should be elected nothing would be done upon it.

Hall Bros., Port Blakely, Wash., are giving the gasoline fishing vessel Edrie extensive alterations to fit her for the halibut fishing trade on the Alaska coast. Her deck houses and pilot houses are being entirely rebuilt. The Edrie is owned by the Chlopek Fish Co., of Seattle, Wash.

The navy department has decided to send the torpedo boat Blakely, now in reserve at the Norfolk navy yard, to the New York yard for extensive repairs, aggregating about $20,000. New boiler tubes and other repairs under the bureau of steam engineering will consume $13,000 of this amount, the remainder being applied to the overhauling of the vessel and her equipment.

The Maryland Steel Co., Sparrow's Point, Md., has begun active construction of the three colliers which it is to build for the United States government. It is planned to have the building of the vessels proceed at the same ratio and as they are to be completed in 12 months from date of contract, the company has added 1,000 skilled mechanics to its already large force. The vessels are to be christened Mars, Hector and Vulcan.

Cobb, Butler & Co., Rockland, Me., had a double launching at their yard Sept. 24, when the three-masted schooner Frank Brainard, of 254 tons, and the four-masted schooner Lewiston, of 814 tons, were sent overboard. The vessels were christened with flowers instead of the customary wine. The Brainard is owned by the Brainard, Shaler & Hall Quarry Co., of Connecticut, and the Lewiston is owned and managed by Crowell & Thurlow, Boston, Mass.

The contract recently announced as having been placed with the Harlan & Hollingsworth Corp., Wilmington, Del., for two new freight steamers for service on Long Island Sound, is now known to be for the Central Vermont Railway Co. The new boats are to replace the Mohawk and Mohegan, which are owned by the New England Navigation Co. and on which the Central Vermont's lease expires next July. The contract with the builders calls for delivery of the new steamers by July 1, 1909.

The Union Iron Works, San Francisco, Cal., although not the lowest bidders, have been awarded contract for effecting the repairs to the German steamer Anubis, of the Kosmos line, which was wrecked last month on San Miguel Island. The steamer was very badly damaged and will require extensive repairs. The Union Iron Works Co.'s bid was $68,900 as against $68,750 by Moore & Scott, San Francisco, and $68,870 by the Heffernan Machine Works, of Seattle, Wash.

The New York Ship Building Co., Camden, N. J., launched the new United States revenue cutter Tahoma, Oct. 10. She is destined for the Puget Sound district and has been built at a cost of $225,000. The name Tahoma was adopted for the vessel at the suggestion of Congressman Cushman, it being the old Indian name for the great mountain in Washington, and was chosen for the reason that there is already a naval cruiser named Tacoma. The Tahoma is 200 ft. long, 31 ft. beam and 18 ft. deep.

Joseph Supple, of Portland, Ore., is likely to get the order for constructing a new steamer for the Kitsap County Navigation Co., of Seattle, Wash., to replace the steamer Sentinel which that company recently sold to the Merchants' Transportation Co., of Tacoma. The new steamer is to cost about $65,000 and will be larger and faster than the Kitsap, of the same company's fleet, and which was built at the Supple yard, being planned to accomplish a speed of about 20 miles an hour.

The Green Ship Yard at Chelsea, Mass., was the scene of the launching of the fishing schooner Washatie last week. The schooner is building for Capt. E. A. Malone, and is 100 ft. long, 21 ft. beam and 9 ft. 9 in. deep. She will be fitted out at Gloucester.

The Harlan & Hollingsworth Corp., Wilmington, Del., has been awarded contract for the construction of two steamers for service on Long Island Sound. The name of the owner has not as yet been made public. The steamers are to be 296 ft. long, 44 ft. beam, 60 ft. over guards and 20 ft. deep. They will be fitted with engines of 4,000 H. P. each.

The Willamette Iron Works, Portland, Ore., launched the steel steamer H. B. Kennedy, Oct. 20. The Kennedy has five steel bulkheads, dividing the steamer into six watertight compartments. Two of the bulkheads extend to the ceiling of the hurricane deck, the three remaining being extended to the ceiling of the main deck.

The Union Dry Dock & Repair Co. is the name given in the articles of incorporation filed at Jersey City last week for a concern to be capitalized at $150,000, and which is to be located at the foot of Clifton road and North river, Weehawken, N. J. The incorporators are: John F. Walsh, 60 Morton street, New York; Howard W. Sullivan, of Weehawken, N. J., and Fred B. Sullivan, 156 Hewes street, Brooklyn, N. Y.

The Bath Iron Works, Bath, Me., will soon lay the keel for a new steel car transfer steamer which when completed is to ply on the Knox & Lincoln division of the Maine Central railroad, running between Bath and Woolwich. The vessel's dimensions are: Length, 243 ft. over all; beam, molded, 47 ft.; width over guards, 72 ft.; draught, light, 7 ft. She will be fitted with two two-cylinder engines, the cylinders being 26-in. diameter by 36-in. stroke. The engines are calculated to develop 2,000 I. H. P. Steam will be furnished by four Scotch boilers designed for a working pressure of 150 pounds. They will be 13 ft. in diameter by 12 ft. 7 in. in length with a total grate surface of 265 sq. ft. Each boiler will be equipped with three 44-in. diameter Morrison corrugated suspension furnaces.

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(Continued from page 19.)

type. The shells are made of Class B boiler plate, water chests of composition. tubes of composition, and tube sheets and supporting plates of "rolled naval bronze." The forward water chest being the one for the entrance and exit of circulating water, has a division plate with a 7-in. by-pass valve on the outside of the chest. Each water chest has eight 10-in. manholes, fitted with composition covers, inside of which are placed zinc plates. The following are the data for each:

Cooling or heating surface	8,999 sq. ft.
Number of tubes	5,630
Thickness of tubes	18 B.W.G.
Outside diameter of tubes	⅝ in.
Length of tubes as fitted	10 ft. 0¼ in.

Augmenter Condenser.—An arrangement called a "vacuum augmenter," devised by the Parsons Turbine Co., is installed for the purpose of increasing the vacuum above that obtained by the air pump.

The augmenter consists of a steam syphon drawing air from the condenser and discharging it to the air-pump suction at a pressure of from 1 in. to 1.3 in. of mercury higher than the condenser pressure. The discharge from the syphon passes through a small condenser in order to condense the steam of the syphon jet. The air pump also has a direct water suction from the condenser through a pipe having a water seal and holding a head of water equal to the difference in pressure produced by the augmenter jet. The augmenter was in use at all times during the trials, and produced an increase in vacuum of from 1 in. to 1¼ in.

Auxiliary Condenser and Dynamo Condenser.—There is one auxiliary condenser located on the port side of the forward engine-room. It is horizontal, cylindrical, and of the surface-condensing type, connected, through the auxiliary exhaust pipe, to all auxiliary machinery. It is only for use in port. Its dimensions are as follows:

Cooling or heating surface	601 sq. ft.
Number of tubes	630
Thickness of tubes	18 B.W.G.
Outside diameter of tubes	⅝ in.
Length of tubes as fitted	6 ft. 0⅞ in.

A similar condenser is located in the dynamo-room for the exclusive use of the dynamo-engine. Its dimensions are as follows:

Cooling or heating surface	202 sq. ft.
Number of tubes	212
Thickness of tubes	18 B.W.G.
Outside diameter of tubes	⅝ in.
Length of tubes as fitted	6 ft. 0⅞ in.

Feed-Heaters.—A vertical dead-end cylindrical feed-water heater is located at the forward end of each engine room on the discharge side of the main feed-pumps. The heating agency is steam from the auxiliary exhaust line, which enters the shell at the top, circulates around the tubes over a system of baffles, and drains at the bottom through a trap to the condenser. An air coil is fitted in the lower water-chest, with one end extending into the heater to a point where air forms between the water and the steam. This coil leads direct to the condenser. A drain at the bottom of the heater conducts the condensed water to a trap, thence to the condenser. The feed-water passes through the tubes. The tubes contain twisted brass strips, held in place by a perforated plate over the tube-sheet to retard its flow and insure sufficient heating. The dimensions of the heater are as follows:

Heating surface	601 sq. ft.
Number of tubes	630
Thickness of tubes	16 B.W.G.
Outside diameter of tubes	⅝ in.
Length of tubes as fitted	6 ft. 0⅞ in.

Feed and Filter-Tanks.—There are located in the after part of each engine room combined feed and filter-tanks, each of about 1,500 gal. capacity. A partition divides each tank into two parts, one part being for the filter and the other for feed-tank proper. The capacity of the former is about 300 gal., and the latter about 1,200 gal. The filter has an inner bottom of bolted perforated plates, and is divided by a series of vertical partitions. The partition plates are in pairs, one secured to the top and the other to the bottom of the filter; the passage of water from one chamber to the next being under the hanging partition plate, up between the two and over the top of the standing partition. The entering water flows into the first chamber over the top of a plate and leaves the last chamber in like manner; these plates forming, with the sides of the tank, entrance and exit chambers, insuring that the filter chambers are always filled and the filtering material submerged.

Lubrication.—The lubrication of all main journal bearings, thrust bearings, and line shaft bearings is by oil supplied under about 10-lb. pressure by steam-driven oil pumps. The oil passes through a cooler on its way to the bearings. Tanks of 150-gal. capacity are located in the lower parts of engine rooms, one in each, from which the oil pumps draw. These tanks take the return of the oil from all bearings supplied with forced lubrication, by gravity. The discharge of the oil from the turbine bearings is through glasses, so that the flow can be observed, and thermometers are fitted to these discharges. The oil pipes are all of copper, and have no valves fitted either to or from the bearings. Two pumps, Blake, vertical, simplex-piston type, 10 in. by 9 in. by 12 in., are supplied, one in each engine room. Either or both may be used. An oil cooler of the surface-condenser type, with oil passing through the tubes and the water around them, is provided in each engine room. The oil passes four times the length of the cooler by means of bridges in the oil heads. The circulating water is taken from either the engine room fire and bilge pumps or main circulating pumps, and discharges through outboard delivery pipes. Additional oil may be supplied to the forced-lubrication system by an overhead gravitation system from the tanks containing reserve oil. The outlets for oil in the casings are at a high level, so that there is always in the casing wells a large gathering of oil which is at about the same temperature as the shaft.

Main Air Pumps.—Two independent Blake vertical twin-beam air pumps, 14 in. and 35 in. by 21 in., are installed, one to each engine room. The suction openings are 12 in. in diameter, and the discharge 11 in. The air pump suctions take from the lower end of the vacuum augmenter condensers and water seals (see vacuum augmenter condenser, Fig. 4).

Main Circulating Pumps.—For each main condenser there is one main circulating pump, centrifugal, with vertical compound engine of B. I. W. design, steam cylinders 10 in. and 16 in. in diameter; stroke, 10 in.; 42-in. diameter runner. Each pump is of sufficient power to discharge 11,000 gal. of water per minute at about 360 revolutions. Each pump is fitted with pipes and valves to draw from the sea and the main drain, and to deliver into the condenser or overboard through valves in the condenser water chest. Circulating water for oil coolers may be supplied from these pumps.

Auxiliary Air and Circulating Pump.—For the auxiliary condenser there is installed one simplex, horizontal, combined air and circulating pump of Blake type, 6 in. by 10 in. by 10 in. by 12 in. This pump has suction pipes from the auxiliary condenser and the sea, and discharge pipes to main feed tanks and to auxiliary condenser.

Auxiliary Air and Circulating Pump (Dynamo Room).—This pump is for serving the dynamo auxiliary condenser, and is a simplex, horizontal, combined air and circulating pump,

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6 in. by 8 in. by 8 in. by 12 in., of Blake type. Its connections are similar to those for the other auxiliary air and circulating pump. Curves of I. H. P. are shown in Fig. 5.

Main Feed Pumps.—There are two Blake vertical simplex piston feed pumps, 15 in. by 10 in. by 15 in., one in each engine room. They take their suction from feed tank connecting pipes or channel ways, and discharge through grease extractors into the main feed discharge, directly or through the feed water heaters.

Auxiliary Feed Pumps.—Three Blake vertical simplex piston feed pumps, 9 in. by 6 in. by 12 in., are installed for auxiliary feed purposes, one in each fire room. These pumps have suction pipes from the boiler bottom blows in same compartments, main feed tanks and feed suction pipe. They discharge as auxiliary feed and overboard in the same compartment, and to main feed tanks and to fire extinguishers. Curves of I. H. P. are shown in Fig. 6.

Reserve Feed Pump.—One Blake vertical simplex piston pump, 10 in. by 9 in. by 12 in., is installed in the forward engine room, with suction pipes from reserve feed water tanks, suction main and filling pipe from ship's side, and discharge to reserve feed tanks and main feed tanks.

Boilers.—There are 12 Normand water tube boilers of the intermediate type in the vessel, in three watertight compartments, four to each compartment. The following are the boiler data:

Designed working pressure.....	250 lb.
Test pressure	400 lb.
Ratio of grate surface to heating surface	1 to 46
Length of grates	7 ft. 2⅛ in.
Width of grates	8 ft. 0⅞ in.
Per cent of air space in grates.	49
External height	12 ft. 5⅝ in.
External length	11 ft. 6⅝ in.
External width	11 ft. 4 in.
Number of furnaces	1
Grate surface	58 sq. ft.
Heating surface	2,670 sq. ft.
Total grate surface.....	696 sq. ft.
Total heating surface.....	32,040 sq. ft.
Weight of boiler with water...	19,675 lb.
Boiler tubes	Cold drawn seamless steel .986 No. 10 B. W. G., C. D.,
Number of tubes, each boiler..	1⅜ in.
Lengths vary for each row.	
Mean height of smoke-pipes above grates	63.25 ft.
Diameter of smoke-pipes	72 in.

The forward and after smoke stacks have two boilers each, and the two middle stacks four boilers each.

Steam gages on boilers are connected to the water drums.

Steam Piping.—The main steam line is arranged in two systems, one on each side of the ship. The branch from each boiler is 5 in. in diameter, and the main steam pipes, which are 5 in. in diameter at the forward boilers, increase in diameter at each successive connection from boilers to 7 in., 9 in., 10 in., 11 in., and 12 in., respectively, the last diameter continuing to the handling platform in its respective engine room. There is a stop valve in each main steam pipe forward of the connections from boilers in the after and middle fire rooms. Abaft the forward engine room bulkhead there is a 9-in. cross connection pipe between the main steam pipes on each side of the ship. An auxiliary steam line is installed, and this line has cross connection to the main steam line in the forward engine room. The auxiliary exhaust line is used on feed heaters and on the steam gland system. The usual joints, drains, etc., are fitted.

PERFORMANCE.

FOUR HOURS OFFICIAL TRIAL.

Steam Pressure

	Starboard.	Port.
Mean steam pressure at engines, ...lb.	242.4	246
In main H.-P. turbine (per gage) .....lb.	237	240
L.-P. turbine (absolute)....lb.	30.2	29.9
Vacuum in condensers, inches of mercury, mean	28.9	28.3
Temperatures (Average of One-Half Hourly Observations.)		
Injection .....deg.	37.6	36.6
Discharge ..... "	73	83.6
Hot-well ..... "	78.2	96
Feed-water ..... "	222.4	206
Engine-room, working platform "	51.5	59
Fire-rooms, working level... "	42.6	
Smoke-stacks, average ..... "	848	
Revolutions, or Double Strokes, per Minute (Average of One-Half Hourly Observations.)		
Average revolutions, main engines .....per min.	616.7	611.92
Pumps, main air.....	26	24
Pumps, circulating	201	170
Pumps, feed, d. s.....per min.	46	54
Dynamo-engines	400	
Blower-engines	349.8	
Speed of ship .....knots	26.522	
Slip of propeller in per cent of its own speed based on mean pitch ..... (1) (2)	25.71	25.99
Shafts are numbered from starboard to port ..... (3) (4)	26.18	24.34
Air pressure in fire-rooms, in inches of water, mean.....	2.74	
Indicated Horse-Power.		
Air, circulating, and feed-pumps, main	328	
All other auxiliaries	235	
Coal.		
Kind and quality used on trial	Pocahontas hand picked	
Pounds per hour, main and auxiliary engines, during trial	38,332	
Pounds of coal per square foot of grate surface, per hour...	55.08	

TWENTY-FOUR HOURS OFFICIAL TRIAL AT 22½ KNOTS.

Steam Pressure.

	Starboard.	Port.
Mean steam pressure at engines	230 lb.	
In L.-P. cruising turbine, gage..	..	192
In main H.-P. turbine, gage....	96	93
In L.-P. turbine, absolute.....	15	13.8
Vacuum .....in.	28.3	29.5
Temperatures (Average of One-Half Hourly Observations.)		
Injection .....deg.	36	36
Discharge ..... "	63	59
Hot-well ..... "	74	70
Feed-water ..... "	182	205
Engine-room, working platform "	..	68
Fire-rooms, working level... "	54	
Smoke-stacks, average ..... "	629	
Revolutions, or Double Strokes, per Minute (Average of One-Half Hourly Observations.)		
Average revolutions, main engines, per minute	459.71	486.97
Pumps, main air	19.7	21.4
Pumps, circulating	143	156
Pumps, feed, d. s.....per min.	28.7	22.5
Dynamo-engines	400	
Blower-engines	180.3	
Speed of ship .....knots	22.782	
Slip of propeller in per cent of its own speed, based on mean pitch ..... (1) (2)	15.66	16.94
Shafts are numbered from starboard to port ..... (3) (4)	26.08	15.15
Air pressure in fire-rooms in inches of water, mean.....	0.7	
Coal.		
Kind and quality used on trial..	Pocahontas run of mine	
Pounds per hour, main and auxiliary engines, during trial	18,063	
Knots per ton of coal.....	2.82	
Pounds of coal per square foot of grate surface per hour....	25.95	

TWENTY-FOUR HOURS' OFFICIAL TRIAL AT 12 KNOTS.

Steam Pressures.

	Starboard.	Port.
Mean steam pressure in engine room	148	
In H. P. cruising turbine (gage)	77.3	
In I. P. cruising turbine (gage).		34.6
In main H. P. turbine (gage)...	8	6.8
In L. P. turbine (absolute).....	3.3	3.4
Vacuum .....in.	28.4	28.6
Temperatures (Average of One-Half-Hourly Observations).		
Smoke-stacks, average .....deg.	566	
Revolutions, or Double Strokes, per Minute (Average of One-Half-Hourly Observations).		
Average revolutions, main engines .....per min.	254.09	245.29
Pumps, main air	8.6	11.5
Pumps, circulating	109.4	113.4
Pumps, feed d. s.....per min.	10	
Dynamo engines	400	
Speed of ship, in knots.....	12.2	
Slip of propeller in per cent of its own speed, based on mean pitch ..... (1) (2)	12.21	24.66
Shafts are numbered from starboard to port ..... (3) (4)	19.59	12.08
Coal.		
Kind and quality used on trial	Pocahontas run of mine	
Pounds per hour, main and auxiliary engines, during trial....	4,091	
Knots per ton of coal.....	6.68	
Deduced Data.		
Pounds of coal per sq. ft. of grate surface per hour.....	17.63	

NOTE.—The H. P. on these trials was taken with the Denny-Johnson torsion meter made especially for the vessel. Unfortunately this meter did not give results within reason. All parts were very carefully adjusted, and were examined during and after the trial to see that nothing had become loose. Also after the trial the two screws on each side of the vessel were alternately towed by the screws of the other side and allowed to revolve, giving the zero error of the machine, which was found to be *nil.* The observations were taken and checked by three different observers. After the experiments were over the meters were sent to the New York yard and tested there. It was found that two of them gave accurate results except at certain points where the wires were broken. The other two did not give reliable results. On examining the recording box carefully it was found that the rheostat coils of these two meters were broken, and that various wires in the cable were also broken. The shafts varied so much in H. P. that it was impossible to calculate the H. P. with any degree of accuracy from the results of the two meters that worked satisfactorily.—*Journal of the American Society of Naval Engineers.*

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VESSELS TOTALLY LOST, FIRST QUARTER 1908.

Lloyds Register of British and Foreign Shipping has just sent out its summary—covering the period from Jan. 1 to March 31, 1908—of ocean vessels of over 100 tons totally lost, condemned or otherwise removed from the active list.

The summary shows that of ocean steam vessels there were taken from the list in those three months 84, aggregating 112,991 gross tons, of which number one was abandoned at sea, three were destroyed by fire, 11 lost in collisions, 11 foundered, 12 are missing, and 45 were wrecks.

With regard to ocean sailing vessels the report states that 88, aggregating 53,025 tons, were lost in the first quarter of 1908, 17 being abandoned at sea, four broken up, two burned, seven sunk in collision, nine foundered, one was condemned as a total loss, 12 are missing, and 36 wrecked.

There was therefore removed from Lloyds Register the sum of 172 ocean vessels, both steam and sail, with a tonnage of 166,016, of which number 30 were of American registry, with a tonnage amounting to 26,167.

The summary shows the number of vessels and total tonnages of the principal maritime powers to be, according to Lloyds Register, as follows:

VESSELS OWNED.

	Steam.		Sail.	
Flag.	Number.	Gross tons.	Number.	Gross tons.
British ...	9,511	17,001,139	2,006	1,319,529
American...	*1,112	1,542,177	*1,934	1,231,988
German ..	1,713	3,705,700	381	404,862
Norwegian..	1,181	1,264,002	980	654,529
Swedish ..	889	686,517	649	191,031
Japanese....	829	1,068,747	...	.....
French ...	869	1,284,368	674	477,415
Russian ..	687	720,199	672	217,713
Danish ...	501	650,955	358	77,635

*Excluding vessels in the trade of the great lakes.

NEW SAILORS' INSTITUTE.

Facing the piers of the great trans-Atlantic liners, as it stands at the corner of West and Jane streets, the new Sailors' Home and Institute offers splendid temporary quarters for the seamen of the port of New York. One or two institutions for the shelter and protection of sailors ashore may be capable of accommodating more inmates, but it is safe to say every institution of the kind has been eclipsed by the great building established by the American Seamen's Friend Society. Conspicuous by its lantern tower, it is a landmark on the mile of trans-Atlantic wharfage, best known to ocean travelers and to the 7,000 men of the merchant marine who are constantly visiting and revisiting the neighborhood.

Built at a cost of $325,000, of which sum $150,000 was contributed by Mrs. Russell Sage, the institute is admirably devised to serve as the center of the system of the American Seamen's Friend Society's branches in 45 principal ports of the world. Most appropriate was the circumstance that its opening and dedication yesterday fitted in with the eightieth anniversary of the society, which, since 1828, has carried on its valuable work among sailors along the water front, conducted from its headquarters in Wall street, where the Seamen's Savings Bank has been one of the most successful of its offshoots. The anniversary is being celebrated by a week's conference of the chaplains and missionaries of the society. Among these are the society's representatives in Sweden, Denmark, Germany, Belgium, Italy, Argentina and Brazil, while the British and Foreign Sailors' Society sent its senior secretary, the Rev. E. W. Matthews, to attend the conference and the Boston Seamen's Friend Society, the New York Port Society, and a Toronto organization had delegates also present.

The building is capitally equipped for meeting the sailors' wants. There are 200 bed rooms available for sailors for 25 cents a night and for officers at from 50 to 75 cents. These have been furnished at the expense of individuals and societies interested in the work of the American Seamen's Friend Society. Passing from floor to floor one sees special suites and social rooms provided for the officers, engineers, seamen and stewards, who may prefer to use the institute in preference to their bunks aboard ship in dock or may be temporarily stranded ashore. The institute is at once a club and a hotel, the billiard rooms, reading and writing rooms promising to give relaxation and comfort. A pretty little concert hall, seating 400, will be devoted to entertainments, and a chapel is provided for undenominational services.

For the special requirements of the sailor's life in port care has been taken to organize a bank, a shipping bureau and outfitting store, so that the sailor may be freed from the clutches of the "crimp" and boarding house "shark," whose peculiar prey he is. The management of the institute is under the care of the port and sailors' home committee, of which Theodore L. Peters is chairman. The superintendent is Charles L. Green, and the lady missionary is Miss Josephine R. Upham, who comes from the Sailors' Haven, Boston.

SEPTEMBER LAKE LEVELS.

The United State Lake Survey reports the stages of the Great Lakes for the month of September, as follows:

Lakes—	Feet above tide water New York.
Superior	602.79
Michigan-Huron	581.26
Erie	572.72
Ontario	247.14

Since last month, lake Superior has fallen 2¼ in., lakes Michigan and Huron have fallen 5¼ in., lake Erie has fallen 5 in., and lake Ontario 9¾ in. The large fall in all the levels of the lakes have been due to a drought of unusual persistence, rainfall being almost entirely lacking.

During October, lake Superior should fall 1 in., lakes Michigan and Huron 2¾ in., lake Erie 3½ in., and lake Ontario 4 in.

Lake Superior shows a height about 4½ in. lower than the average September stage of the past ten years, and about 4½ in. less than last year. It is 10¾ in. higher than in 1891, but 2 in. lower than in 1906, and lower by 5¾ in. than in 1903.

Lakes Michigan and Huron show a stage 4 in. above the average September stage of the past ten years, 1¾ in. lower than last year, but 18¼ in. higher than in 1896. In 1885 the water was 23¾ in. higher.

Lake Erie is slightly lower than in September last year. It is 5 in. above the mean Steptember stage of the past ten years, and 12¼ in. higher than in 1896. It is, however, 14¾ in. lower than in 1876 and 13 in. lower than in 1885.

Lake Ontario shows the highest September stage since 1904, when it was 1¼ in. higher. In 1861 it was 5½ in. higher, and in 1862 5¾ in. higher. It is 15¾ in. higher than the average September stage of the past ten years, 37¾ in. higher than in 1895, 1¼ in. lower than in 1886, and 24½ in. higher than in 1901.

When the dry dock at the Puget Sound navy yard was filling recently preparatory to floating out the cruiser Colorado, which had just been repaired, she listed to port in a dangerous manner and considerable difficulty was experienced in getting her out of the dock safely. On being moored she did not right herself and it is thought that one of the new plates leaked, although later the cause was found to have been imperfect stowage of supplies. The Colorado received her injuries by grounding on Liplip Point, Puget Sound, in a fog.

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PACIFIC COAST NOTES.

Office of the MARINE REVIEW,
302 Pioneer Bldg., Seattle, Wash., Oct. 16.

The steamer Norwood, owned by Sudden & Christian, of San Francisco, bound from Grays Harbor, Wash., to San Pedro, Cal., was struck recently in a dense fog about four miles west of Point Gorda, Cal., by the Standard Oil Co.'s steamer Ascuncion. The Norwood's passengers were transferred to the Ascuncion, which steamer turned about and towed the Norwood, in a badly waterlogged condition, back to San Francisco. The Norwood was struck on the port side, amidships, below the water line and badly damaged. Only her cargo of lumber prevented her from sinking at the scene of the accident. The bow plates of the Ascuncion were badly stove in. To prevent her leaking most of her cargo of oil in the forward tanks was pumped into the sea. The officers of both steamers assert that the collision could not have been averted.

The new Colman dock at Seattle, the finest pier in the northwest, is nearly completed. The new dock extends into the bay 700 ft. and represents an investment of more than $80,000. Ten Puget Sound steamship lines will use the new wharf, including the Puget Sound Navigation Co., the Seattle-Tacoma line, and the Port Orchard route. The passenger traffic of the city will be largely concentrated at this pier and it will be possible to take steamers from it to any part of Puget Sound.

The Merchant's Transportation Co., of Tacoma, has bought the steamer Sentinel, formerly owned and operated by the Kitsap County Navigation Co., of Seattle. The consideration is said to be $20,000. The Sentinel is 117 ft. long, 20 ft. beam and has a capacity of 235 passengers. She will be operated by the Tacoma company between Tacoma and Seattle via the West Pass of Vashon Island. The Kitsap County Transportation Co.'s steamer Burton now on this run, is to be taken off. The Sentinel is speedier than the Burton and will give the residents along the West Pass much better service.

Five new lights at Willapa Bay, Wash., and one at Grays Harbor, Wash., are being established and will be in commission by Nov. 1. By the addition of these lights the dangers incident to entering Willapa Bay at night will be greatly lessened.

The dredge Coronado has arrived at Grays Harbor from San Francisco. She will go immediately to South Bay, Grays Harbor, Wash., where a channel will be dredged and a large area of land filled for a colonization company. The Coronado is one of the largest dredges on the Pacific coast and was towed to Grays Harbor by the steamship Riverside.

First class passengers will be no longer carried on the Pacific Mail liners China and Asia. The liners will remain on the run between San Francisco and the Orient but will carry only second class and steerage passengers hereafter.

Sloan Bros., of Seattle, have secured the contract for the repair of the barkentine Good News, which arrived on Puget Sound Aug. 18, after an unusually long and perilous voyage of 213 days from Wilmington, Del. The amount of the contract is $7,050. The specifications call for practically rerigging the vessel and for supplying a new set of canvas.

The sternwheel steamer Port Simpson, bound from Hazelton to Port Essington, British Columbia, narrowly escaped destruction recently in Kitselas canyon. The Port Simpson while passing through the canyon was swung around by the swift current until her stern struck the bluff, her bow struck the other side and smashed and it was feared for a time that she would jam and turn over as did the Mount Royal about a year ago in the same place. As it happened the Port Simpson escaped with a badly smashed stern and bow and with her engines in a wrecked condition. She may be brought to Victoria, B. C., for repairs.

As a result of the wreck of the Star of Bengal on Coronation Island recently, in which over 100 persons lost their lives, charges have been filed against Capt. Patrick Hamilton, of the tug Kayak and Capt. Fargar, of the tug Hattie Gage, declaring that the tug captains showed criminal cowardice at the time of the tragedy. The charges will be heard before United States steamboat inspection officers and if they be proved the United States grand jury in Alaska will indict the two tug captains on a felony charge. The accused men indignantly deny the charges brought against them.

The navy tug Sotoyomo ran aground in the fog at Point White, Oct. 9, while on her way from Bremerton to Seattle. After lying on the beach for some time she was floated at a high tide. Examination showed that the damage sustained was only nominal.

Cable advices report that the Russian cruiser Oleg ran aground at Libau, Oct. 12, and that a salvage steamer has been sent to her assistance.

NINE-FOOT CHANNEL IN OHIO RIVER.

Capt. Lytle Brown, United States engineer office, Louisville, Ky., reports that the work of construction on a dam across the Ohio river at the head of the falls of the Ohio at Louisville, Ky., has progressed well this season. The stage of the river has been unusually favorable for the prosecution of work of this class. The work accomplished to date this season consists of 600 ft. of movable dam, boule type, 600 ft. of fixed concrete dam from the Indiana shore; and the preparation of the foundation of the Indiana chute for 600 ft. of movable dam, chanoine wicket type. This last section it is contemplated to finish this season if conditions continue favorable. The completion of this dam will secure an all-year 9-ft. channel depth in the Ohio river from Louisville, Ky., to Madison, Ind., a distance of 45 miles and through the Louisville and Portland canal.

BRITISH NAVAL EXPENDITURE.

A British admiralty return gives the naval expenditure of seven nations for the last three years. The total expenditure is as follows:

	1906-1907.	1907-1908.	1908-1909.
Great Britain	£31,472,087	£31,419,500	£32,319,500
France	13,003,238	12,486,793	12,797,308
Russia	12,490,444	8,850,240	9,833,915
Germany	12,005,871	13,623,924	16,596,561
Italy	5,322,154	5,661,822	6,266,193
United States	21,358,199	21,260,932	25,833,217
Japan	3,952,311	8,248,222	8,094,884

The amounts voted for new construction and armaments were as follows:

	1906-1907.	1907-1908.	1908-1909.
Great Britain	£10,859,500	£ 9,227,000	£ 8,660,202
France	5,702,267	5,132,494	5,315,790
Russia	4,576,583	2,846,268	2,703,721
Germany	5,342,466	6,285,225	8,366,438
Italy	1,362,207	1,398,111	1,866,358
United States	8,600,774	6,783,705	7,798,815
Japan	752,595	3,233,298	2,967,918

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FURNESS, WITHY & CO.'S CONFERENCE WITH LABOR.

A notable conference has just recently been held at West Hartlepool, England, between Sir Christopher Furness, head of the ship building and engineering firm of Furness, Withy & Co., and representatives of the men employed in that company's plants.

Sir Christopher told the delegates that it was impossible to carry on the ship building business of the firm unless the incessant friction with employes be stopped. He therefore invited the representatives of all the trades connected with the industry, to meet him to hear certain proposals. These briefly condensed were:

First. That strikes must cease or the works would be closed. Second, if the trades unions thought that they could carry on the business themselves the firm would sell out to them at a price to be fixed by assessors. Third, if the unions would not buy the firm would be willing to assist its workmen as partners on a profit-sharing basis. Fourth, that a council be formed to settle all disputes or refer them to accredited arbitrators.

The labor representatives present requested time in which to consider these proposals.

NEW STEAMBOAT-INSPECTION CIRCULAR.

The Department of Commerce and Labor has recently issued a new circular styled Bureau Circular No. 8, dated Sept. 25, 1908, containing "Sections of Revised Statutes and of Rules and Regulations Relating to Licensed Officers of Steamboats."

It is the intention of the department that the circular shall have as large a distribution among licensed officers of steamboats, and steamboat owners as possible. The local board of inspectors at Cleveland will send a copy of the circular to all licensed officers who have received licenses therefrom, upon receipt of addresses, or the same may be had by applying at the Cleveland office. All owners of steamers inspected in this district will be sent a copy of the circular by mail.

YANKEE TO BE SALVED.

Secretary of the Navy Metcalf has accepted the offer of John Arbuckle, of New York, to raise the cruiser Yankee and tow her to the Brooklyn navy yard, for the sum of $87,500.

Mr. Arbuckle has agreed to supply all the appliances for floating the stranded cruiser from the Hen and Chickens reef in Buzzard's bay where she has lain for three weeks. By the terms of the contract Mr. Arbuckle has the right to abandon the work after he has expended $50,000 and is unsuccessful in floating the ship, in which case the government agrees to stand half the loss. If for reasons beyond his control he is is at any time forced to abandon the work the government also accepts half of the loss.

Mr. Arbuckle plans to use compressed air in his salving operations.

One other bid was received, for $165,000, with less satisfactory conditions.

SCANDAL IN TRANSPORT REPAIRS.

A recent report from San Francisco is to the effect that there have been irregularities connected with extensive repairs which were recently made to one of the vessels of the transport service. It is alleged that repairs to the extent of $90,000 were made and that these improvements were immediately torn out and another contract for repairs to the amount of $150,000 was at once awarded to the same company.

The existing state of affairs is alleged to have been brought to light by two agents of the secret service who enlisted in order to gain the information.

WILL FILE ORIENTAL RATES.

The Chicago, Milwaukee & St. Paul railway has decided that so soon as its Pacific extension is completed it will publish its through and inland rates on oriental traffic, as required by a recent ruling of the Interstate commerce commission. They will be on the same basis as heretofore, except that they will show a reduced rate as the inland proportion of the through rate.

This is contrary to the tactics adopted by most of the other transcontinental lines, they having decided to abandon the import and export business rather than submit to the ruling, which is to become effective Nov. 1. Several lines having steamship connections have made arrangements to dispose of their vessels and charters in consequence of this regulation, and it now remains to be seen whether the trans-Pacific route will continue to be a factor in opposition to the Suez canal, through which goods can now be as cheaply carried as from Pacific coast ports.

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

Items—	To Oct. 1, 1908.	To Oct. 1, 1907.	To Oct. 1, 1906.
Coal, anthracite, net tons	971,088	1,035,790	661,873
Coal, bituminous, net tons	6,142,621	7,553,120	5,482,914
Iron ore, net tons	16,127,105	28,883,106	26,485,982
Wheat, bushels	45,911,157	56,153,551	38,344,415
Flour, barrels	2,860,459	3,997,965	3,967,269

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO OCT. 1 OF EACH YEAR FOR THREE YEARS PAST.

EASTBOUND.

Items—	To Oct. 1, 1908.	To Oct. 1, 1907.	To Oct. 1, 1906.
Copper, net tons	64,841	52,689	77,045
Grain, other than wheat, bushels	17,583,846	25,802,188	31,865,148
Building stone, net tons	1,019	748	4,472
Flour, barrels	2,859,674	3,997,724	3,958,005
Iron ore, net tons	16,127,105	28,883,106	26,485,982
Iron, pig, net tons	14,682	10,799	17,486
Lumber, M. ft. B. M.	329,054	507,594	670,683
Wheat, bushels	45,911,157	56,153,551	38,344,415
Unclassified freight, net tons	63,644	82,180	120,341
Passengers, number	24,170	29,286	29,576

WESTBOUND.

Items—	To Oct. 1, 1908.	To Oct. 1, 1907.	To Oct. 1, 1906.
Coal, anthracite, net tons	971,083	1,035,790	661,873
Coal, bituminous, net tons	6,142,621	7,553,120	5,482,914
Flour, barrels	785	250	9,264
Grain, bushels	700	1,858	6,749
Manufactured iron, net tons	177,203	219,752	246,580
Salt, barrels	406,504	337,367	297,879
Unclassified freight, net tons	489,496	643,441	696,855
Passengers, number	24,955	29,856	29,830

SUMMARY OF TOTAL FREIGHT MOVEMENT.

Items—	To Oct. 1, 1908.	To Oct. 1, 1907.	To Oct. 1, 1906.
Eastbound freight of all kinds, net tons	18,884,150	32,556,664	30,069,562
Westbound freight of all kinds, net tons	7,841,112	9,502,430	7,134,875
Total freight, net tons	26,725,262	42,059,094	37,204,437

The total number of vessel passages to Oct. 1, 1908, was 10,567, and the net registered tonnage, 20,151,041.

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MEETING OF GOVERNMENT ENGINEERS.

In compliance with orders from General Marshall, chief of engineer corps. United States Army, the engineer officers in charge of engineering districts comprised in the division of the great lakes, met in Detroit on Monday, Oct. 12, for a general conference relative to the various works of channel and harbor improvements on the lakes. Those present were: Col. W. L. Fisk, division engineer and in charge of the Buffalo district; Lieut. Col. C. McD. Townsend, in charge of the Detroit district; Lieut. Col. John Millis, in charge of the Cleveland district; Lieut. Col. G. D. Fitch, in charge of the Duluth district; Major T. H. Rees, in charge of the Chicago district; Major W. V. Judson, in charge of the Milwaukee district, and Major Charles Kellar, in charge of the Lake Survey.

There was a general discussion of the various works and improvements now in progress, a comparison of plans and methods, and an informal consideration of the needs of lake commerce in the several districts. On Tuesday the officers, accompanied by Gen. Lydecker, formerly division engineer, and in charge of the Detroit district, visited the rock excavation and dredging work now in progress under charge of Lieut. Col. Townsend at the Limekiln Crossing and in Livingstone channel, Detroit river.

The operation of submerging the Japanese Transporter for the purpose of putting the two submarines in place in her hold, was successfully accomplished in the Queen's Graving Dock at Liverpool recently. It was necessary to submerge the vessel each time a submarine was placed in position for sinking with the water in the hold of the Transporter. Both of the small vessels are now lying snugly in the hold of the larger one and all that remains is to overhaul the Transporter prior to sending her on her long voyage.

QUESTIONS FOR MASTERS AND MATES—NO. 16.

235. What is meant by the magnetic circuit of a magnet?

236. How could you age a magnet by artificial means?

237. Why is it that two magnets of the same size and from the same bar of steel, will not have or retain the same amount of magnetism?

238. What is a molecule?

239. What is meant by specific gravity?

240. How many feet in a knot?

241. How many feet in a sea mile?

242. How many feet in a geographical mile?

243. What is meant by the mean nautical mile?

244. Is a nautical mile longer on the equator than at the poles? Why?

245. What should be the length between knots on the log line if a 20 second sand glass is used?

246. What is a sand glass and explain its use?

247. What is the buoyant effect of a cubic foot of water in pounds?

248. How much weight will a piece of iron having a volume of 1,728 in. lose when immersed in water?

249. How many fathoms in a mean nautical mile?

ANSWERS TO QUESTIONS FOR MASTERS AND MATES—No. 16.

235. The direction of the lines of force in the magnetic field of a magnet.

236. Place it end to end with a powerful magnet, like poles together. It may also be aged by being boiled in oil.

237. The steel may not have the same density.

238. A particle. It is the smallest quantity of a substance that can exist by itself.

239. The specific gravity of anything is its weight compared with that of water—that it is so many times as heavy as an equal volume of water.

240. 6,080 ft.

241. One minute of latitude. It varies with the latitude from 6,046 ft. to 6,109 ft. as you go north, or south from the equator.

242. 6,087.2 ft.

243. 6,076.8 ft. It is the mean of all sea miles which vary with the latitude. It is found by dividing the length of a meridian (whose diameter is the mean of the earth's longest and shortest diameter) by the number of minutes in 360 degrees.

244. No. On acount of the formation of the earth, the equator being its point of greatest diameter. A nautical mile is 6,046 ft. at the equator and increases with latitude to 6,109 ft. at the poles.

245. 33.7 (33 ft. 9 in.) for nautical miles, 29.3 (29 ft. 4 in.) for stat. mi.

246. A glass vessel having two compartments connected by a glass tube through which the sand runs from one compartment to another. It is used to measure time when using the log.

247. 62.42 lbs.

248. 62.42 lbs.

249. 1,012.8 fathoms.

SUMMARY OF NAVAL CONSTRUCTION.

The monthly summary of naval construction, issued by the bureau of construction and repair, shows the following progress upon vessels:

Name of Vessel.	Building at—	—1908— Per Cent of Completion. Sept. 1.	Oct. 1.
BATTLESHIPS.			
South Carolina	Wm. Cramp & Sons	58.1	63.2
Michigan	New York S. B. Co.	65.1	71.4
Delaware	Newport News S. B. Co.	40.5	44.2
North Dakota	Fore River S. B. Co.	50.1	54.2
TORPEDO BOAT DESTROYERS.			
Smith	Wm. Cramp & Sons	49.3	53.8
Lamson	Wm. Cramp & Sons	46.7	52.1
Preston	New York S. B. Co.	47.9	49.1
Flusser	Bath Iron Works	20.1	26.1
Reid	Bath Iron Works	20.1	26.0
Paulding	Bath Iron Works		(No report)
Drayton	Bath Iron Works		" "
Roe	Newport News S. B. Co.		" "
Terry	Newport News S. B. Co.		" "
Perkins	Fore River S. B. Co.		" "
Sterrett	Fore River S. B. Co.		" "
McCall	New York S. B. Co.		" "
Burrows	New York S. B. Co.		" "
Warrington	Wm. Cramp & Sons		" "
Mayrant	Wm. Cramp & Sons		" "
SUBMARINE TORPEDO BOATS.			
Stingray	Fore River S. B. Co.	55.7	58.7
Tarpon	Fore River S. B. Co.	54.5	57.3
Bonita	Fore River S. B. Co.	54.1	55.5
Snapper	Fore River S. B. Co.	53.8	55.7
Narwhal	Fore River S. B. Co.	48.2	50.9
Grayling	Fore River S. B. Co.	47.9	50.3
Salmon	Fore River S. B. Co.	46.8	50.3
COLLIERS.			
Vestal	Navy Yard, New York	95.2	96.2
Prometheus	Navy Yard, Mare Island	77.1	82.7
TUG BOATS.			
Patapsco	Navy Yard, Portsmouth	77.0	79.0
Patuxent	Navy Yard, Norfolk	88.0	95.0

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ATLANTIC COAST NOTES.

Office of the MARINE REVIEW,
Room 1065, No. 90 West St.,
New York City.

According to the trans-Atlantic conference returns the westbound steerage movement for the week amounted to 8,405 and the eastbound to 6,565. Attention is called to the fact that the westbound movement again predominates, though as yet it has not assumed importance. Comparing the business from Jan. 1 to date of the present year with 1907, eastbound, there is a decrease of 4,642 first class, an increase of 2,801 second class, and an increase of 240,655 third class passengers. West bound, for the same time, there is a decrease of 7,407 first class, 50,137 second class and 826,893 third class passengers, the latter figure in each class including steerage.

The secretary of commerce and labor has awarded the exclusive privilege of furnishing food and maintaining a restaurant at the Ellis Island Immigration station, New York harbor, to Fritz Brodt. The contract expires in June, 1911. Mr. Brodt's bid for supplying service during light immigration was $519,250 and under normal conditions, $1,077,750.

President Franklin Mooney, of the New York & Porto Rico Steamship Co., announces the inauguration of a new service from Galveston and Port Arthur to ports in Porto Rico. The service for the present will be monthly, but will probably be increased in time to two sailings per month. The steamer Saturce sailed on the service at the close of last week. The company maintains a weekly service between New York and Porto Rico and a semi-monthly service from New Orleans.

The Anchor Line steamship Perugia, which arrived at New York harbor recently from Leghorn, Naples, and Almeria, Spain, had two passengers on the cabin list. The Perugia, in addition to 26,000 barrels of Spanish grapes, had a cargo of wine, olive oil, liquors, macaroni, nuts, sulphur oil, dried fruit, sculptures and marble works.

The tug William H. Flannery, of the Flannery Towing Line, collided with the steamer New York, of the Albany Day Line, off Thirty-fourth street, North river, New York, on Friday evening. The New York was making her pier at the time of the accident and the tugboat proceeding up stream. The steamer suffered some damage on her port side, the smaller vessel being badly damaged. Thomas Farrell, the pilot of the Flannery, was placed under arrest by the harbor police, charged with criminal negligence and drunkenness.

The Booth Steamship Co. has announced the resumption of the tri-monthly sailings from New York to Amazon river ports. The steamers Cuthbert, Maranhouse, Benedict, Cearense and Crispin will sail on Oct. 30, Nov. 14, Nov. 30, Dec. 14 and Dec. 30, respectively.

The Cassie F. Bronson, a four-masted schooner which has been fast near Little River, coast of South Carolina, for over two years, has been floated. The Bronson is owned at Mystic, Conn., and cost originally $50,000. She is now worth approximately $20,000.

The steamship Seneca arrived at New York on Monday having on board 22 members of the crew of the British steamer Hesleyside, wrecked off the Bahamas on Oct. 1. The Hesleyside was trapped in a narrow passage between two of the islands when the hurricane struck the vessel. In spite of the utmost efforts to save her the steamer was driven on the reefs. Through a fireman volunteering to swim ashore with a line, a proposition that was successful, the crew was saved. The captain of the Hesleyside remained to look after the interests of the vessel's owners.

The bark Astral, from Philadelphia and Baltimore for San Francisco, which was picked up off Sea Girt, N. J., by the tug Astral, has been docked at New York. Capt. Dunham reported having encountered a severe hurricane during which the ship lost all her canvas and had the topgallant masts carried away. During the entire blow the vessel maintained a heavy list to port, one of the port lifeboats being carried away. She was loaded with coal on account of the United States government.

The British steamship Burbo Bank, which arrived at Philadelphia on Saturday from Santiago de Cuba, arrived in ballast, this being due to the heavy rain on the east end of Cuba while the vessel was endeavoring to load a cargo of iron ore. The captain of the Burbo Bank decided after some delay that loading was out of the question.

The British steamship Valentia, which arrived at the Delaware breakwater on Friday, sprung a leak during the passage. A hole was found in the forehold in the bilge and temporary repairs were made at sea with a wooden plug and cement. The vessel was sugar laden from Java.

The steamer New York of the Hudson River Day Line, was entirely destroyed by fire while lying at the T. S. Marvel ship yard at Newburg, N. Y., awaiting repairs to damages sustained in a collision with a tug in New York harbor last week. It is believed that four negro waiters perished in the flames.

ANNUAL MEETING NATIONAL BOARD OF STEAM NAVIGATION.

The National Board of Steam Navigation held its thirty-seventh annual meeting at Philadelphia, Oct. 7 and 8. The meeting was a very successful one although owing to the lakes-to-the-gulf deep waterways convention in Chicago on the same dates many of the western and southern members were unable to attend.

As the Founders' Week celebration was being held in Philadelphia the members in attendance had many opportunities for enjoyment, having taken part in the great naval parade and witnessed the principal sights as the guests of the Philadelphia contingent.

Officers were elected as follows: President, Horace Wilson, of the Wilson line, Wilmington, Del.; first vice president, F. B. Dalzell, of F. B. Dalzell & Co., New York; second vice president, W. H. Crump, master of transportation, Consolidated Monongahela Coke & Coal Co., Pittsburg, Pa.; treasurer, J. Frank Tilley, 8 Market street, Pittsburg, Pa.; secretary, Henry L. Joyce, 143 Liberty street, New York; chairman of the executive committee, Walter B. Pollock, manager marine department, New York Central lines.

AROUND THE GREAT LAKES.

The steamer Siemens, which stranded on Nine Mile Point during the heavy smoke on Sunday last, has been released. She was not damaged.

The Great Lakes Steamship Co., Ltd., has been incorporated under the Ontario Companies Act, with a capitalization of $250,000. The offices are to be at Toronto, Ont., and the company is authorized to build or otherwise acquire

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and operate vessels of every description, wharves, docks, warehouses, dry docks, elevators, etc., and to carry on a general transportation business both by land and by water. The provisional directors are: R. L. D. Taylor, H. L. Dunn, A. R. Cochrane, M. E. Cherrier, E. L. Bradley, Toronto. The company is reported to be negotiating for the construction of three vessels at Tyne ship yards, the orders for which will probably be placed in the spring.

The steamer S. M. Clement, bound down with ore, ran aground in Lake St. Clair on Sunday last. She was released by the tug A. C. Harding after lightering 400 tons of her cargo.

The steamer Western States of the Detroit & Buffalo Steamboat Co. made her last trip of the season between Buffalo on Sunday last. The steamer Eastern States will continue the service until Nov. 15.

L. C. Sabin, general superintendent of the Sault canal, has issued the following bulletin: "The plant at the Middle Neebish dyke is now working on the north half of the channel, leaving the south half clear for vessels. Masters are requested to avoid the buoys placed to mark the navigable channel."

The wooden steamer Rust was badly damaged by fire while lying at the Lake Shore docks at Toledo on Monday of this week, the loss on the steamer and cargo being estimated at $20,000. The cause of the fire is unknown.

The steamer Pahlow and barge Delta were caught in a storm on Lake Michigan on Tuesday, both vessels losing their deck loads of lumber. When they reached Racine the barge was leaking badly.

The dredge Gladiator which burned some time ago at Bar Point, was taken to Amherstburg on Monday last, where she will be stripped. Later she will be docked at Detroit.

Lieut. Com. W. A. Edgar, inspector ninth lighthouse district, has issued a bulletin to the effect that the Waugashance 16-ft. shoal buoy No. 5, Straits of Mackinac, which was reported adrift Oct. 15, will be replaced as soon as practicable.

The steamer Lyman C. Smith which struck a pier in the Canadian canal at the Sault recently and sank, collided with the barge McWilliams in Lake St. Clair on her way down.

John Radford, chief engineer of the steamer Australia, who was taken ashore at Erie recently, died in a hospital there.

Plans for a large addition to the coal dock of the Northern Coal & Dock Co. on Connor's Point have been completed, and the company is now asking for bids upon this work. It is the intention to crib in the property between the Northern dock and the new Philadelphia & Reading dock. New unloading rigs will be installed on the new structure, and both the handling and storage capacity greatly increased. The dock at present has a capacity of about 300,000 tons.

The schooner George Sturges, built at Sheboygan, Wis., in 1872, is reported a derelict on the Atlantic ocean, having been abandoned at sea during a heavy gale nearly two weeks ago.

The steamer D. M. Clemson, while endeavoring to enter Ashtabula harbor in a heavy sea last Monday night, was forced onto the inner side of the breakwater broadside on, and sustained several broken plates. The plates were broken just at the water line and the water bottom filled. She will have to be temporarily repaired before leaving Ashtabula.

At a meeting of the board of directors of the Lake Erie Excursion Co. in Buffalo on Tuesday of this week it was announced that while the company will not build a duplicate of its steamer Americana this year, it has secured options on some of the finest passenger steamers on the lakes, and in procuring a steamer will endeavor to select one as nearly a duplicate of the Americana as possible.

A horrible explosion ocurred aboard the steamer Maggie Marshall while she was making her last trip of the season on Lake Michigan Monday night. The steamer was in mid-lake off Kenosha when a steam pipe burst, blowing the main valve of the engine into the stairway. Four members of the crew were killed by the escaping steam. The steamer was anchored and sounded distress signals, but as no assistance was received, three sailors attempted to reach shore in a boat. The sea was high and when about a mile off shore the boat capsized and the men were obliged to swim ashore.

The schooner Lizzie A. Law and the barge Selden Marvin, in tow of the steamer Edward Hines, went ashore on Lake Superior in a heavy storm last Monday night. The tow line between the steamer and barges parted, and owing to the thick smoke and heavy weather, the barges were quickly lost to view. The Hines was sheltered at Portage entry and later went out in search of the barges. The schooner Law stranded on the east shore of Keweenaw Point about 10 miles from Portage entry in the direction of Traverse Island, and was pounded to pieces. There was hardly anything left of the schooner when the Hines discovered her. The crew were in constant danger of being washed overboard on Monday night, the waves running high over the vessel. A sailor ventured ashore in a yawlboat, but it capsized and he reached shore with much difficulty, carrying a line with him by means of which the rest of the crew escaped. The Selden Marvin, which also went adrift, was scuttled upon being located on Wednesday and it is believed she can be saved. The Lizzie A. Law was a wooden vessel built in 1875 at Port Huron, Mich. She was 196 ft. keel, 38 ft. beam and was owned by the Edward Hines Lumber Co., Chicago.

OPPOSES INCREASED APPROPRIATION.

Secretary of the Navy Metcalf has decided that he will not ask for more funds with which to increase the force of the navy and of the marine corps next year. It is believed that Secretary Metcalf has just become a convert of President Roosevelt's policy of economy although at the last session of congress Mr. Metcalf was not wholly in sympathy with the proposal to provide more men and officers for the service. In spite of this congress authorized 3,000 additional men for the navy and 750 additional men and 51 officers for the marine corps. This brings the present authorized strength up to 42,000 enlisted men and 2,500 apprentice seamen under instruction, which number is not sufficient to man the ships now building and afloat. Navy officers think, however, that the president would not enforce economy at the expense of the service if he were acquainted with all the facts.

MEETING OF GOVERNMENT ENGINEERS AT ST. LOUIS.

A board of government engineers convened at St. Louis Oct. 15 for the purpose of discussing the problems of the Lakes-to-the-Gulf deep waterway scheme and reporting thereon to the authorities at Washington. Col. W. H. Bixby presided. The other members of the board were: Lieut. Col. C. McD. Townsend, Detroit; Lieut. Col. J. G. Warren, Cincinnati, both of the engineer corps, United States army; H. B. Richardson, New Orleans, and Major H. P. Ritter, coast and geodetic survey.

Plans for a 14-ft. channel from St. Louis to Memphis were considered and the board made an inspection trip down the Mississipi river. Two methods were discussed, one for a canal and the other for the deepening of the river channel.

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ITEMS OF GENERAL INTEREST.

The revenue of the North German-Lloyd Steamship Co. for a period covering the first six months of 1908 shows a falling off of about $2,750,000 as compared with the same period for 1907. This decrease is attributed mainly to the diminished traffic from the United States.

The captain of the fruit steamer Senator was washed overboard in the hurricane which swept the Atlantic recently. Capt. Aarsbold attempted to save a sail which had been put up in the emergency and which threatened to carry away. As he crossed the deck it was swept by a great wave and he was carried overboard. It is probable that the Senator's cargo will be a total loss owing to the great quantities of water which she shipped. Twelve days were required to make the trip from Port Antonio to New York, although five days is the usual voyage.

The Fall River Line steamboat Commonwealth rammed the Norwegian steamship Volund in a thick fog on the Sound Sept. 26, the latter vessel being sent to the bottom. The captain and crew were taken from the wreck by a lifeboat manned by United States sailors who were aboard the Commonwealth together with 2,000 other passengers. The Commonwealth, which is the newest and largest vessel on the Sound, was but slightly damaged, which is regarded as proof of the excellence of her construction. Excellent discipline prevented a panic aboard the larger boat after the collision.

Capt. Van Schaick, who was in command of the excursion steamer General Slocum when she burned four years ago at New York, causing nearly 1,000 persons to lose their lives, and who is now serving a term in Sing Sing prison for negligence, has been placed in command of a small river boat plying between the old prison and the new one which is being constructed on the opposite side of the Hudson three miles south of Highland Falls. The steamer carries a gang of 50 convicts who are engaged in work upon the new prison. In the spring it is intended to have a larger boat and Capt. Van Schaick will again be given command.

The Japanese cruisers Asho and Soya are under orders to visit the United States probably early next spring, according to recent advices from the Orient. The cruisers will start from Yokosuka for San Francisco, calling at Honolulu en route. After a short stay at San Francisco they will proceed to Puget Sound ports and Victoria and Vancouver, B. C. It is 10 years since a Japanese warship visited the Pacific coast, the last one being the cruiser Hiyei. The Asho and Soya are former Russian warships, the former being the cruiser Bayan in which Admiral Wirens fought and the latter the resurrected cruiser Variag, built at Cramps', which was sunk in the first dash of the Japanese fleet upon Cemulpo harbor.

Representatives of the German and Italian steamship lines at a conference held at Berlin, Sept. 16, decided to raise the rates between Mediterranean ports and New York at once. The increase will amount to $10. A number of points in dispute were agreed upon, the agreement to be submitted to a conference of all the lines to be held the latter part of the month, when it is expected that further questions regarding rates will be settled.

The Harlan & Hollingsworth Corp., Wilmington, Del., delivered a large floating grain elevator to the Pennsylvania railroad recently, which has been stationed at Philadelphia. The elevator has a capacity for handling 10,000 bushels per hour and was much needed for transferring grain from the elevators at Girard Point and Washington avenue to line steamships which take on cargoes at their regular piers. The new elevator is the largest in the port of Philadelphia. It is equipped with electric lights and the highest grade of machinery. The towers are 70 ft. above deck, thus making it possible to load any modern freight steamship. It is 98½ ft. in length over all, 30 ft. beam and 12 ft. deep, from top of deck to keel. It is equipped with one boiler, 9 ft. 3 in. by 10 ft. 3 in.

BIDS FOR REPAIRS TO LIGHT VESSEL.

Bids received by the light house inspector at Boston, Mass., for making repairs to light vessel No. 42, and which were opened Sept. 25, were as follows:

F. P. Wood Boiler Works, New Bedford, Mass., $1,456; extra metal, $1.85 per sheet.

*New Bedford Boiler & Machine Works, New Bedford, Mass., $2,101; extra metal, $1.40 per sheet.

*Accepted.

BIDS FOR SUPPLYING POWER BOAT.

Bids received by the lighthouse inspector at Chicago for supplying one power boat for the South Manitou light station, were as follows:

*Racine Boat Co., Racine, Wis.	$560.00
Truscott Boat Mfg. Co., St. Joseph, Mich.	648.75

*Accepted.

DREDGING NANSEMOND RIVER.

Bids opened by Major Joseph E. Kuhn, government engineer, Norfolk, Va., for dredging Nansemond river, Va., about 20,000 cu. yds.:

	Prices bid per cu. yd.
River & Harbor Improvement Co., Philadelphia, Pa.	29c
L. M. Lewis Dredging Co., Norfolk, Va.	15 4/10c
Coastwise Dredging Co., Norfolk, Va.	19 4/10c
Norfolk Dredging Co., Norfolk, Va.	15½c
Atlantic Dredging Co., Philadelphia, Pa.	23c

BIDS FOR WHARF AND SEA WALL.

Bids received by the United States engineer at Mobile, Ala., for the construction of a wharf and sea wall at Fort Gaines, Ala., opened Oct. 9, were as follows:

Hieronymus & Ollinger, Mobile, Ala.	$79,722.97
Richard M. Murphy, New Orleans, La.	70,541.95
W. C. Spotswood, Mobile, Ala.	71,716.46
Blackstaff Engineering Co., Philadelphia, Pa.	79,478.23
Charles Clarke & Co., Galveston, Texas	81,647.54
Edwards Construction Co., Tampa, Fla.	128,089.85
Grant Wilkins, Atlanta, Ga.	81,808.32
Christie & Lowe, New Orleans, La.	67,389.80

AWARD OF BARGE CANAL CONTRACT.

State Superintendent of Public Works F. C. Stevens awarded contract No. 55, barge canal, on Oct. 15, to Arthur McMullen, New York, for the sum of $905,347, as against the engineers' estimate of $1,014,525. The contract covers the construction of a dam and its appurtenances in the vicinity of Delta, at the headwaters of the Mohawk river.

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The Atlantic Ocean Freighter

"OSSABAW"

(New York City-Brunswick Ga.)

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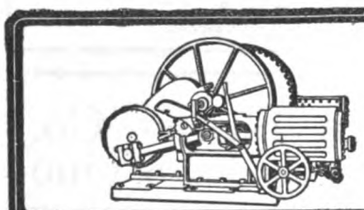
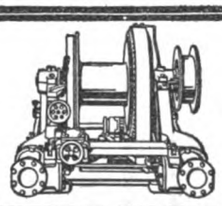
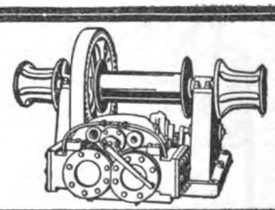

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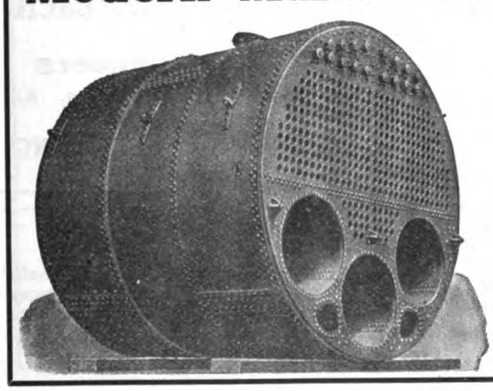

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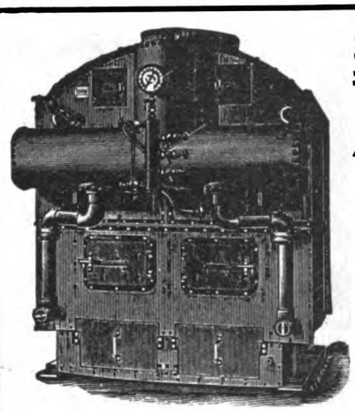

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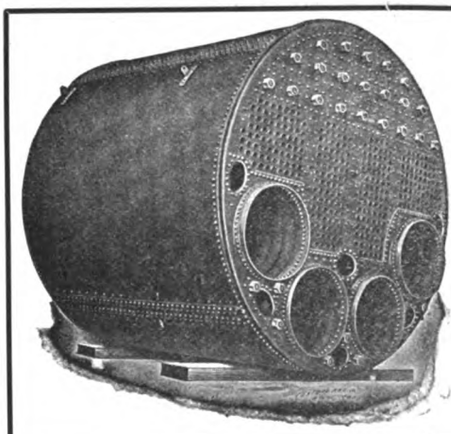

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CLOTH (Waterproof).

Bunker, E. A., New York, N. Y.

COAL (Producers and Shippers).

Hanna, M. A., & Co., Cleveland, O.
Lorain Coal & Dock Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.
Pittsburg Coal Co., Cleveland, O.
Toledo Fuel Co., Toledo, O.

COMPASSES.

Ritchie, E. S., & Son, Brookline, Mass.

COMPOUND (Boiler).

Bird-Archer Co., New York, N. Y.

COMPOUNDS (Lubricating).

Cook's Sons, Adam, New York, N. Y.

CONDENSERS.

Great Lakes Engineering Works, Detroit, Mich.

CONTRACTORS (Dredging).

Breymann & Bros., G. H., Toledo, O.
Buffalo Dredging Co., Buffalo, N. Y.
Dunbar & Sullivan Dredging Co., Buffalo, N. Y.
Great Lakes Dredge & Dock Co., Chicago, Ill.
Northern Dredge Co., Duluth, Minn.
Starke Dredge & Dock Co., C. H., Milwaukee, Wis.
Sullivan, M., Buffalo, N. Y.

CONTRACTORS. (Pile Driving and Submarine.)

Buffalo Dredging Co., Buffalo, N. Y.
Dunbar & Sullivan Dredging Co., Buffalo, N. Y.
Great Lakes Dredge & Dock Co., Chicago, Ill.
Parker Bros. Co., Ltd., Detroit, Mich.
Starke Dredge & Dock Co., C. H., Milwaukee, Wis.
Sullivan, M., Buffalo, N. Y.

CONTRACTORS (Public Work).

Breymann Bros., G. H., Toledo, O.
Buffalo Dredging Co., Buffalo, N. Y.
Dunbar & Sullivan Dredging Co., Buffalo, N. Y.
Griscom-Spencer Co., New York, N. Y.
Great Lakes Dredge & Dock Co., Chicago, Ill.
Starke Dredge & Dock Co., C. H., Milwaukee, Wis.
Sullivan, M., Buffalo, N. Y.

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